IMPERIAL AGRICULTURAL
RESEARCH INSTITUTE, NEW DELHI.

# TRANSACTIONS

# OF THE

# AMERICAN

# ENTOMOLOGICAL SOCIETY

VOLUME LVIII

HALL OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA
LOGAN SQUARE
1932

LANCASTER PRESS, INC.
LANCASTER, PA.

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TRANSACTIONS

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AMERICAN ENTOMOLOGICAL SOCIETY

VOLUME LVIII

# STUDIES IN THE DIPTEROUS FAMILY EPHYDRIDAE PAPER IV[1]

BY EZRA T. CRESSON, JR.

This is the fourth and last paper on my studies of the Ephydridae in the collection of the Naturhistorischen Museums in Wien, and is a report on the genera *Hydrellia* and *Ochthera*. There are also included notes on and descriptions of some material from other collections.

## **HYDRELLIA** Robineau-Desvoidy

This is a very homogeneous genus and consequently many of its species are difficult to distinguish without considerable study. It has taken the writer several years, working on a large amount of North American and much European material, to secure any definite conception of many of the species here treated. The works of previous students of this family have given comparatively little help in distinguishing the species, as many of the characters used in their descriptions were found to be of little or no value. Consequently, before attempting to characterize the species, an exhaustive study of all the forms represented in the material at hand was necessary to secure some idea of the specific value of the various structural and color characters. In some species the facial color was found to be of little significance; in others it is apparently very constant; also the color of the antennae, often a secondary sexual character, but heretofore considered of primary importance, in many cases, showed much variation within the same species. In fact there are comparatively few characters which hold the same relative value in all species, and although there are several evident groupings of the species holding certain characteristics in common, these characters usually break down in the peripherical species The male genitalia will probably prove to be of some value in the separation of the species, but I have not yet made any critical study of these organs, leaving this to be done when more material and time are available; furthermore their small size requires special technic which I have not the time now to develop.

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[1] I. Trans. Am. Ent. Soc., LI, p. 227–258, (1925); II. Trans. Am. Ent. Soc., LV, p. 165–195, (1929); III. Trans. Am. Ent. Soc., LVI, p. 93–131, (1930).

In the present study I found that the development of the anterior dorsocentral bristles and their relative position in respect to the next posterior pair and to the suture, are of considerable value. The rectangle formed by these four bristles I have termed the *dorsocentral rectangle;* which may be quadrate, transverse (broader than long), or rarely elongate. The discoloration of the humeri with respect to the mesonotum, I have also found valuable in several species-groups; and the relative distance between the posterior ocelli (*interocellar distance*) and that of the anterior ocellus from the lunular margin (*anteocellar distance*) is another character I have used. The incorporation of these characters in describing species will add much to the value of the description.

Much difficulty was encountered in trying to determine the species from the descriptions by those not familiar with their specific characteristics; and as misidentifications retard rather than advance our knowledge of a species, I have purposely avoided recognizing those species where I did not feel reasonably sure of my determination, preferring to consider my specimens as representatives of new species. Consequently this treatment will probably result in the creation of some synonymy which can be definitely determined when the types of these doubtful and unrecognized species are critically studied and redescribed.

This study of the Meigen types, made possible through the generosity and kindness of Dr. Zerny of the Vienna National Museum, has been of inestimable value to me in securing the proper concepts of many of the older European species, and the much desired foundation for subsequent work in this genus.

In hopes of securing a sufficient knowledge to present in the near future a practical revision of its species, the writer desires to study all available material of this genus.

The genus seems to be holarctic in distribution with the exception of a few species occurring in the more southern faunas. It is unfortunate that I could not recognize more of the described palaearctic species in the material studied, as it would then be possible to construct a key for their separation.

The species grouped around *griseola*, as here presented, are not satisfactory, and it is very possible that my determinations here will in some instances prove incorrect, but time cannot be given at present for a more exhaustive study. With the exception of this species and its closely related forms, particularly *incana* and *modesta*, I do not think there will be much trouble in recognizing the species herein characterized.

**Hydrellia lunata** new species

The series from which this species is described agrees very well with the description of *H. varipes* Lamb, from the Seychelles Islands,[2] except in the number of facial bristles, of aristal hairs, and in the color of the legs.

Black; including antennae; palpi, knobs of halteres, and middle tarsi, basally, yellow.

Medifrons, narrow frontal orbits, mesonotum, scutellum, and abdomen, shining, slightly metallic green, all slightly dusted with brown. Lunule white. Face golden yellow. Cheeks, postbuccal area, humeri, pleurae, venter of abdomen extending onto apical lateral angles of third and fourth segments, coxae and femora, opaque, grayish; metanotum brownish. Frontalia opaque black.

Head broader than high, nearly twice as high as long; frons short and broad; proclinate orbital anterior to line of anterior ocellars and very near lunular margin. Cheeks about one-half as broad as face. Third antennal segment scarcely longer than broad. Prescutellar pair of bristles far removed from base of scutellum; the latter flat with bristles long.

*Type.*—Male; East London, Cape Colony, South Africa, (H. K. Munro), [Transvaal Museum Collection]. *Paratypes.*—3 ♂, 8 ♀; topotypical.

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[2] Trans. Linn. Soc. London, Zool., xv, p. 325, (1912).

**Hydrellia pilitarsis** Stenhammar

1844. *Hydrellia pilitarsis* Stenhammar, Handl. K. Svenska Vet.-Akad., 1843, p. 219.

The specimen upon which I recognize this species is a male collected at Schildhorn, Berlin, received from Dr. Walther Horn as *H. pilitarsis* Stenh. It is in fair agreement with the descriptions by Stenhammar and Becker.

That this species belongs to the *griseola*-group is evident by the development of the fifth and sixth abdominal segments. The general color is ochreous rather than gray, becoming the latter color on the pectus and ventral lobes of the abdomen; of the latter there are encroachments onto the dorsum at the posterior lateral angles of the third and fourth segments. The humeri are almost concolorous with the mesonotum, but may be slightly more grayish. The mesopleura are not contrastingly gray. Face golden, very broad below, orbits strongly flaring, making the cheeks easily as broad as third antennal segment; in profile, evenly convex, not more prominent below. Fore coxae pale, more or less obscured by gray pollen; all tarsi dark; although the flexor pile on the hind tarsi may be only slightly longer and more dense than usual, it is however noticeable.

**Hydrellia maculiventris** Becker

1896. *Hydrellia maculiventris* Becker, Berl. Ent. Zeit., XLI, p. 175.

As here recognized, this species is distinct from *griseola* in possessing a silvery-white, narrow, flaring face, and pale fore coxae. The anterior dorsocentral is more reduced than is general with *griseola*.

Of this species I have seen one male from Vienna, collected by Mik.

**Hydrellia portis** new species

A member of the *griseola*-group. Fifth abdominal segment of the male broadly truncate and the anterior dorsocentrals reduced as in *griseola*, but the face is evenly convex, scarcely produced beyond the orbital profile. The mesonotum is subopaque, brownish, becoming gray anteriorly. This latter character readily distinguishes this species from *H. lunata*, just described.

Black including antennae; palpi, knobs of halteres, trochanters, bases of middle and hind tarsi, tawny to yellow. Subopaque, olivaceous brown, slightly dusted with brown above on medifrons, frontal orbits and mesonotum; grayish on occiput, pleurae, metanotum, and venter of abdomen. Scutellum and abdomen more shining, slightly metallic green or bronze. Lunule white; face sericeous pale yellow to golden depending upon the angle of vision.

Face rather narrow; orbits strongly flaring below, so that the cheeks are about as broad as the face at upper third; carina weak but rather distinct; facial profile rather evenly convex, scarcely produced beyond orbital contour; four to five rather fine bristles each side; arista with six hairs. Anterior dorsocentral strong, rather approximate to suture and to the posterior dorsocentral; a second posterior dorsocentral as strong as the anterior one. Abdomen subovate; fifth segment of male broadly truncate apically. Legs normal. Wings with third costal section longer than second; second vein straight.

*Type.*—Male; Port Elizabeth, Cape Colony, South Africa, (H. K. Munro; February 24, 1919), [Transvaal Museum Collection]. *Paratype.*—1 ♂; topotypical.

**Hydrellia griseola** (Fallen)

1813. *Notiphila griseola* Fallen, Handl. K. Svenska Vet.-Akad., xxxiv, p. 250.

1835. *Hydrellia griseola* Macquart, Hist. Nat. Ins., Dipt., ii, p. 523.

This is the most common species in the genus and is apparently as common in North America as in Europe, although the American representative may be a distinct subspecies.

In this species we have the lower half of the face, in profile, very prominent, more so than in any other European species I have seen of this group. The males and generally the females have the face yellow to golden brown, becoming almost totally white in the females, but with all the intermediate tones. The mesonotum is dark in color, brownish to olivaceous posteriorly, becoming gray to almost white anteriorly, especially on the humeri. The intergradation is usually gradual, rarely are the humeri in strong contrast with the anterior margin, as in variety *modesta;* more often is the entire anterior portion of the mesonotum gray. The fifth abdominal segment of the male is broadly truncate and convex; the second vein of the wings long and curving into the costa. The above characteristics taken together with the approximation of the weak anterior and strong posterior dorsocentrals will generally enable one to distinguish this species.

In establishing the status of this species, I am influenced by the originally described general metallic greenish gray color. There is no doubt but that Fallen's original series contained specimens of the species here described, as well as some of other very different species. Meigen, judging from the specimens in the Vienna Collection, also had apparently a composite series under this name; but Loew seems to have restricted the species as I have characterized it here.

Under this name in the Vienna Collection I found numerous specimens correctly determined by Meigen, Frauenfeld, Schiner and others, and a few which proved to be of other species. Among the undetermined material there were many, mostly from Austria, Hungary, Bohemia, Germany, Holland and Sicily.

In the Paris Museum, according to Becker[3] there is a specimen which he considered the type of *Notiphila nigriceps* Meigen.[4] This he described as having the thorax ash-gray, palpi black, and face black and sericeous. He also stated that the specimens in the Vienna Museum are similar. In the latter Collection, under this name, I find a male and two females bearing label "nigripes Coll. Winth." all in poor condition, apparently greasy. It appears that these were labeled in error by someone relabeling the collection. The male and one female, I consider to be *griseola*, the other female, which also bears an additional label "nigriceps" in Meigen's hand, is apparently a specimen of *Hydrellia incana* Stenhammar. I cannot find these specimens agreeing with Becker's description above mentioned, particularly in the color of the palpi. The blackened color of the face seems to be due to a greasy discoloration. A more critical examination of the Paris specimen is necessary before the status of *nigripes* can be satisfactorily established.

At present I have determined these specimens as *griseola* Fallen.

**Hydrellia griseola var. modesta Loew**

1860. *Hydrellia modesta* Loew, Neue Beitr., VII, p. 23.

As near as I can determine what Loew described as *Hydrellia modesta*, we have merely a form of *griseola* in which the face is in the usual tones of yellow while the lunule is white; the anterior dorsocentral is more generally stronger than in *griseola* and the mesonotum more brownish, leaving only the humeri gray, but we find the anterior margin of the mesonotum also grayish. With the exception of the white lunule (of which I have not seen any intergradation) the above characters are also present in the series of *griseola* examined.

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[3] Zeit. f. Hym. u. Dipt., II, p. 295, (1902).

[4] Beschr. Syst. Beschr. Europ. Zweifl., VI, p. 67, (1830).

Under this name in the Vienna Collection I have labeled fifteen specimens including four correctly determined by Schiner. Mostly from Austria, and Germany.

A female with following data: Dohne, Cape Colony, South Africa, (H. K. Munro; 10.5.25), is apparently conspecific with the series of this variety I have seen from Europe. The mesonotum is more ochreous than olivaceous, leaving only the humeri gray; and the third costal section is almost as long as the second. More material, especially of males, may show other characteristics which would warrant different treatment.

### **Hydrellia incana** Stenhammar

1844. *Hydrellia incana* Stenhammar, Handl. K. Svenska Vet.-Akad., 1843, p. 222.
1846. *Notiphila incana* Zetterstedt, Dipt. Scand., v, p. 1871.
1856. *Hydrellia ranunculi* Haliday, Ins. Britt., iii, p. 345. [not Haliday 1839.]
1860. *Hydrellia ranunculi* Loew, Neue Beitr., vii, p. 23.
1896. *Hydrellia ranunculi* Becker, Deut. Ent. Zeit., xli, p. 182.
1914. *Hydrellia incana* Collin, Sc. Proc. R. Dublin Soc., xiv, p. 252.
1926. *Hydrellia incana* Becker, Linder. Fl. Pal Reg., Ephyd., p. 68.

The above I think is the complete bibliographical and synonymical record of the species, with the possible exception of faunal lists. This species has long been considered a synonym of *Hydrellia ranunculi* Haliday (1839), but Collin (1914) has satisfactorily established the fallacy of such treatment. I am however not certain as to the identity of *incana*. As here recognized it is apparently a white face, cinereous form of *griseola*, but which typically differs from *griseola* in the more flattened profile of the face, especially that of the males, and the stronger anterior dorsocentral; but as there seems to be all intergradations, it is impossible to draw a well defined structural differentiation. If my determination is correct, it seems that we must use this name for the white face forms of *griseola*, but even here we will often be confronted with a decision between pale yellow and white.

As here recognized, this species, typically, has the face and lunule snow white, sericeous, which in profile is almost evenly convex, not strongly carinate nor strongly produced at lower third; arista with six to eight hairs; mesonotum brownish with humeri gray; second costal section generally shorter than in *griseola*.

In determining the material in the Vienna Collection, I have labeled as *incana*, all those specimens allied to *griseola* possessing a white face and lunule. There I found eight specimens under *ranunculi* Haliday, of which two proved to be the yellow face *griseola*. In addition I found among the undetermined material and under other names, sixty-one specimens, mostly from Austria, Bohemia, Ilyria, and Holland.

This species is apparently represented in North America as *Hydrellia hypoleuca* Loew.

**Hydrellia enderbyi** (Hutton)

1901. *Drosophila enderbyi* Hutton, Trans. N. Zeal. Inst., xxxiv, p. 174.
1926. *Hydrellia enderbyi* Tonnoir & Malloch, Rec. Cant. Mus., iii, p. 15. [type redescribed.]

This may not be Hutton's species, but my specimens agree reasonably well with Tonnoir & Malloch's redescription; and as the New Zealand and Australian faunas are very similar it is probable that my determination is correct. However, I am giving a rather full description of the specimens before me, so that it should not be difficult for one having access to Hutton's type to prove or disprove this treatment. The material at hand consists of a specimen of both sexes from Victoria, Australia, 1888, [Vienna].

Black, including tarsi; palpi and halteres, yellow. Frons slightly broader than long, with orbits distinctly converging. Medifrons and narrow parafrons, subopaque, olivaceous; anteocellar and interocellar distances subequal. Frontalia more blackish, in frontal aspect becoming indistinct and with the entire frons, of a uniform brownish color. Lunule broad, white or tinged with ochre. Face uniformly brownish yellow in the male, becoming white on cheeks; in profile not visible, or slightly so; orbits strongly flaring below; four to five moderately strong bristles each side, in series up to middle of profile. Cheeks as broad as third antennal segment. Arista with five to six hairs. Palpi with few black bristles.

Mesonotum subopaque, olivaceous, dusted with brown. Scutellum concolorous; anterior dorsocentral not distinct on the male, more so on the female; posterior pair anterior to line of intraalar setulae. Humeral and supraalar calli, pleura, metanotum, femora and tibiae, cinereous. Wings slightly brownish; second costal section slightly longer than third, ultimate section of fifth vein slightly longer than posterior crossvein.

Abdomen concolorous with scutulum, with lateral margins and ventral lobes cinereous; second to fourth segments subequal in length; fifth slightly longer and sixth very distinctly visible. Length, 2 mm.

The female has the face white, with orbits not so flaring and cheeks consequently narrower; the anterior dorsocentrals are more differentiated from the setulae.

**Hydrellia cochleariae** Haliday

1839. *Hydrellia cochleariae* Haliday, Ann. Nat. Hist., III, p. 403.

1839. *Hydrellia erythrostoma* Haliday, Ann. Nat. Hist., III, p. 403. [nec *Nothiphila erythrostoma* Meigen, 1830.]

1856. *Notiphila nigripes* Haliday, Ins. Brit., III, p. 345. [nec Zetterstedt, 1838.]

1914. *Hydrellia cochleariae* Collin, Sc. Proc. R. Dublin Soc., XIV, p. 253.

The misidentifications of Haliday have been cited by Collin (1914). Dr. Becker[5] considered this a variety of *N. nigripes* Zett., but I doubt if he was acquainted with the present species, and furthermore, his treatment is nomenclatorially incorrect as the present species has priority.

This species belongs to the *griseola*-group in that the fifth abdominal segment of the male is broadly truncate. The third antennal segment of the male is entirely yellow; of the female dark brown. Face sericeous yellow to white, rather flattened below; orbits not strongly flaring below. Frons uniform in color, the vittae not conspicuous, scarcely differentiated. Palpi dark with pale tips. Mesonotum including humeri and notopleura, dark, somewhat grayish; dorsocentrals close to sutural region, the anterior one slightly stronger than the setulae. Tarsi mostly dark, but basal segment of hind ones somewhat paler. Abdomen shining, somewhat opaque basally.

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[5] Lind. Fl. Pal. Reg., Fam. 56, p. 66 & 69.

This species as here recognized is based on a male and female kindly sent to me by Mr. James E. Collin, collected in the eastern coastal region of England; and a female from Artern, Germany, [Deut. Ent. Inst.].

**Hydrellia porphyrops** Haliday

1839. *Hydrellia porphyrops* Haliday, Ann. Nat. Hist., III, p. 402.
1914. *Hydrellia porphyrops* Collin, Sci. Proc. R. Dublin Soc., XIV, p. 250.

I have not seen this species from Continental Europe; and am acquainted with it only from two specimens kindly loaned me by Mr. James E. Collin, who has compared them with Haliday's type. These are from Snailwell, County Cambridge, England. The broad fifth abdominal segment of the male suggests membership in the *griseola*-group. The following diagnosis should serve to distinguish the species.

Frons broader than long, subopaque with contrasting velvety-black frontalia. Face opaque, pale yellow, very narrow, about one-fifth width of head; in profile evenly convex, not prominent, with about five slender bristles on lower half. Cheeks scarcely one-half as wide as third antennal segment; the latter in the male yellow, in the female, black. Mesonotum, including humeri and notopleura, black, somewhat shining, sparingly dusted with brown. Upper part of mesopleura opaque black. Scutellum and abdomen black concolorous with mesonotum. Halteres whitish. Abdomen rather narrow; fifth segment of male slightly longer than fourth, broad and convex apically. All coxae pale apically; femora black; tibiae dark basally; tarsi pale basally. Second costal section slightly longer than third.

**Hydrellia flaviceps** (Meigen)

1830. *Notiphila flaviceps* Meigen, Syst. Beschr., VI, p. 72.

Here we have a species in which the third antennal segment in the males, fore coxae, and generally most of the tibiae are yellow. The fifth abdominal segment in the males is very long, about three times as long as the fourth, which latter character will separate the species from its near relatives. The females are very difficult to separate from those of what I consider *cardamines* Haliday, in fact I cannot satisfactorily do so. Additional comments on this situation will be given under that species.

This species differs from *obscura* in the more convex face and flaring orbits, as well as in the yellow fore coxae. The third antennal segment is darker in that species. Typically *flaviceps* is larger than either *obscura* or *cardamines* but there seems to be considerable variation in this respect.

The Vienna Collection possesses two specimens on the same pin, bearing labels: (1) "flaviceps Coll. Winth.," (2) "flaviceps." The upper specimen is a male without the head; the lower, a female complete. As Meigen mentions having "Biede Geschlechten von Hrn. von Winthem" I consider this pair as types of this species.

In the same collection, undetermined, I found two more specimens of this species, from Austria. Through Dr. Walther Horn, I have seen two females from Borkum, East Friesian Islands, two males and a female from Potsdam, and two females from Postyen, Czechoslovakia, which I consider conspecific with the type.

**Hydrellia cardamines** Haliday

1839. *Hydrellia cardamines* Haliday, Ann. Nat. Hist., III, p. 402.
1914. *Hydrellia cardamines* Collin, Sc. Proc. R. Dublin Soc., XIV, p. 250.

Through the kindness of Mr. Collin, I have been able to examine both sexes of what he considers this species, based upon his studies of the Haliday types in 1914.

That this is distinct from *flaviceps* Meigen, is evident by the shorter fifth abdominal segment of the males. The females, however, do not show such definite characteristics and are difficult to distinguish. Collin's specimens, from Weybridge, near London, have the face yellow; fore tibiae entirely yellow, with their tarsi contrastingly blackish to the extreme bases; middle and hind tibiae darker than the fore ones. There are four to five aristal hairs, and the second and third costal sections are subequal in length. Otherwise except for their smaller size, I can see no differences of specific importance. The face and lunule may be clear white and the fore tarsi (in one specimen before me) yellowish, not contrasting with tibiae.

Of this species, besides the above noted specimens, I have seen small series from Vienna and Golling, in Austria, [Vienna, 5]; Potsdam, Germany, and Pöstyen, Czechoslovakia, [Deut. Ent. Inst., 4]. A specimen was also received labeled *H. laticeps* Stenh. I may have included some females of this species under *flaviceps*.

**Hydrellia obscura** (Meigen)

1830. *Notiphila obscura* Meigen, Syst. Beschr., VI, p. 67.

1839. *Hydrellia hydrocotyles* Haliday, Ann. Nat. Hist., III, p. 402. [syn., Becker, 1926.]

This species is typical of a group having the anterior dorsocentral wanting or greatly reduced, third antennal segment of males yellow, and fifth abdominal segment of the males narrow, the genitalia somewhat conspicuously developed. I am able to establish the species with certainty from the type in the Vienna Collection. It seems to have been little understood, judging from the erroneous determinations of material I have seen.

Here we have the face of a pale silky yellow appearance, with yellow ground color, narrow, at least twice as long as broad, narrowest at middle; median portion below flat in profile, almost straight; carina not noticeable; side bristles hairlike, with at least two above buccal line. Cheeks narrower than third antennal segment; arista with about six hairs. Palpi yellow. Mesonotum grayish, especially the humeri, gradually becoming brown posteriorly; dorsocentrals 0 : 1 which are very near the sutural region. Abdomen concolorous with the mesonotum, but more shining; fifth segment of the male scarcely longer than the fourth, narrow and somewhat conical, the genitalia not exserted; fourth sternite generally conspicuous and forming a pouch, Coxae and femora black; tibiae and tarsi except apices of latter. yellow; hind tibiae somewhat infuscated subbasally. Wings brownish; second costal section slightly longer than the third.

Dr. Becker, in his paper on the Meigen types,[6] records no type in the Paris Museum, but mentions a female in Vienna. I find a female labeled (1) "obscura Coll. Winth.," (2) "obscura," which is apparently in agreement with the original description, but there is no indication that this specimen was "Von Hrn. Wiedemann." I have, however, labeled it TYPE and have no doubt of its authenticity. Besides the above type, I found in that collection, ten specimens correctly determined, also fifteen specimens in undetermined material, from Austria; and in the material sent to me by Dr. Walther Horn, fourteen specimens mostly from Hungary. The type is slightly larger (2.1 mm.) than the others examined (1.8 mm.) but I do not doubt their conspecific status.

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[6] Zeit. f. Hym. u. Dipt., II, p. 296, (1902).

I can substantiate the synonymy of *H. hydrocotyles* Hal. cited by Becker, after examining homotypic material of that species, kindly given to me by Mr. Collin.

**Hydrellia luteipes** new species

A species from Formosa very similar to *cardamines* of Europe, but the legs are entirely yellow and the third antennal segment dark.

Black; tormae, palpi, legs including coxae, excepting apices of tarsi, yellow, halteres lemon yellow. Third antennal segment brown, paler basally.

Frons distinctly broader than long, with orbits slightly converging; medifrons shining but slightly obscured by brown pollen; anteocellar slightly less than interocellar distance. Frontalia not sharply defined, but more opaque than medifrons. Lunule and face snow-white. Face about one-sixth width of head, prominently convex on lower profile; orbits strongly flaring below; three to four fine bristles on lower third. Cheeks scarcely one-half as broad as third antennal segment. Arista with six hairs.

Mesonotum almost shining, sparingly dusted with brown, with scutellum concolorous. Anterior dorsocentral scarcely differentiated from setulae; posterior dorsocentral near suture. Humeri and pleura cinereous. Metanotum almost polished. Legs with femora very slightly discolored. Wings clear, with pale veins; second and third costal sections subequal in length; ultimate section of fifth vein longer than posterior crossvein.

Abdomen shining (in the type, much shriveled, appearing pale at bases of segments four and five, probably due to a teneral condition), very sparingly dusted above; below cinereous. Length, 1.5 mm.

*Type.*—Female; Anping, Formosa, (H. Sauter; May 19, 1912), [Deutsche Entomologische Institut].

**Hydrellia albilabris** (Meigen)

1830. *Notiphila albilabris* Meigen, Syst. Beschr., vi. p. 71.

This small species is easily distinguished by the velvety black frons, black antennae (which show some dilution at base of third segment or apex of second), and the opaque brown pleura.

In the Vienna Collection I find eight specimens labeled "albilabris Coll. Winth." evidently belonging to Meigen's original series. Of these I select what appears to be a male, in good condition, bearing an additional label, hand written, as the type, and I so label it. The remaining seven specimens I consider paratypes. In addition I find thirty-three specimens correctly determined by Schiner, and Bergenstamm. Two specimens determined by Frauenfeld, proved to be *obscura* Meig.

**Hydrellia tibialis** Cresson

1914. *Hydrellia tibialis* Cresson, Ent. News, xxviii, p. 341.

This species was originally described from western United States. Among the unidentified material from Vienna, I found thirty-one specimens from Golling, Salisburg, Austria which are so similar to the type material of this species, that I hesitate to determine them otherwise. The only difference I can see is in the more shining appearance of the European specimens. It seems strange that this form has not been previously described from Europe. It will probably be found in other collections under *albilabris*.

This species runs to *thoracica* and *lamina* in Becker's 1926 key, but the mesonotum is not yellowish, nor marked in *tibialis*, and the arista has only four to six hairs. It is easily separated from *albilabris*, with which it will likely be confused, by the normally marked frons (only the frontalia opaque), the face with more numerous and closer set bristles and the middle tibiae of the male distinctly incrassate.

**Hydrellia nigricans** Stenhammar

1844. *Hydrellia nigricans* Stenhammar, Handl. K. Svenska Vet.-Akad., 1843, p. 234.

A series of fifteen specimens before me, apparently representing a comparatively common species, was received from several sources determined as *albiceps* Meigen, *lapponica* Stenhammar, *nigricans* Stenhammar, and *nigripes* Zetterstedt. The species cannot be *albiceps* as I understand that species, although Becker[7] considered it synonymous with *nigricans;* nor is it *lapponica* which has the tibiae yellow; neither is it *nigripes* which has decidedly yellow antennae in the males. Of these names we have *nigricans* remaining, the description of which I find applies very comfortably to this form. The following diagnosis should characterize this species sufficiently for recognition:

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[7] Zeit. f. Hym. u. Dipt., ii, p. 296, (1902).

Black; third antennal segment somewhat pale inferiorly and basally, more noticeably in the male. Palpi yellowish; halteres lemon yellow. Tarsi brown to yellowish basally. Medifrons scarcely differentiated from the opaque black frontalia. Face white to slightly ochreous, slightly convex below; cheeks hardly broader than third antennal segment; arista with five to seven hairs. Mesonotum, including humeri and notopleura, blackish, subopaque, sparingly brownish pruinose; posterior dorsocentral strong, very near sutural region; anterior dorsocentral very weak, and also near suture; pleura gray. Abdomen semi-shining, brown pollinose; segments subequal in length. Wing veins dark with second costal section longer than third.

The males are easily overlooked, but may be distinguished by the acutely pointed fifth segment, with no evidence (in the series before me) of a sixth segment and the hypopygium not exserted (I have been unable to see anything of the genitalia, but the pouch-like development at the fourth sternite is sometimes visible).

The following series I consider to belong here:

AUSTRIA: 1 ♀, "Austria Alte Sammlung"; 2 ♀, Hammern; 1 ♀, Marchfeld; 1 ♂, 1 ♀, Bisamberg; [all Vienna].

GERMANY: 1 ♂, 1 ♀, Berlin; 2 ♂, 3 ♀, Potsdam; [all Deut. Ent. Inst.]. 1 ♀, Kiel "griseola Coll. Wiedem."; 1 ♀, Arber, Bohmenwald; [all Vienna].

**Hydrellia tritici** Coquillett

1903. *Hydrellia tritici* Coquillett, Ent. News, xiv, p. 324.

This species is peculiar in having the lunule polished black instead of silvery or yellow pollinose. This polished condition extends ventrad as a median line on the facial carina. As a distinguishing character, may be mentioned the yellow legs with fore tibiae and tarsi black. It is apparently a member of the group including the European *albilabris* Meigen.

The species originally described from Perth, Australia, and before me is a series of 143 specimens from various localities in New South Wales, [Hungary Nat. Mus. Colln., 136; Vienna, 7].

**Hydrellia chrysostoma** (Meigen)

1830. *Notiphila chrysostoma* Meigen, Syst. Beschr., VI, p. 67.
1844. *Hydrellia fulviceps* Stenhammar, Handl. K. Svenska Vet.-Akad., 1843, p. 231, pl. 4, fig. 27. [syn. Becker, 1902.]
1902. *Hydrellia chrysostoma* Becker, Zeit. f. Hym. u. Dipt., II, p. 295.
1860. *Hydrellia fulviceps* Loew, Neue Beitr., VII, p. 21.
1896. *Hydrellia fulviceps* Becker, Berl. Ent. Zeit., XLI, p. 173.

I am basing my conception of this species on the descriptions of Stenhammar, Loew, and Becker, and the specimens before me. Unfortunately I have not seen any males, and therefore can give no characters peculiar to that sex, but the species apparently belongs near *flavicornis* Fallen, differing in having black antennae and facial orbits, and yellow fore coxae. The following diagnosis should characterize the species:

Black; face, except narrow orbits, palpi, fore coxae at least apical two-thirds, apices of middle and hind tibiae, and bases of their tarsi, yellow. Halteres lemon yellow.

Opaque to subopaque. Abdomen shining. Frons black with mesal triangle not well defined; lunule white to yellowish. Face golden to light golden yellow, not sericeous, but very evenly colored, not subject to much variation according to aspect; parafacials linear and black. Mesonotum including humeri, notopleura, and scutellum, dark brown pollinose. Pleura grayish.

Arista with five to six hairs. Anterior dorsocentral absent; posterior pair slightly in advance of line of interalar setulae.

The above diagnosis is based on two specimens from Rosenhof and Wien, Austria, (Mik), [Vienna]; and five from Berlin, Germany, [Deut. Ent. Inst.].

All of the fourteen specimens previously in the Vienna Collection under this name were incorrectly determined, including the specimen labeled in Meigen's hand. This latter was mentioned by Becker in his paper on Meigen's types (1902) as being *griseola* Fallen. Becker, in the same paper, states that what he considers Meigen's type is in the Paris Museum, and that it is the same species that Stenhammar later described as *H. fulviceps*. I can concur with Becker as to the Vienna specimen not agreeing with Meigen's description of *chrysostoma*, and that it is *griseola*.

A study of the fourteen above mentioned specimens gives the following determinations: 1 ♀, "chrysostoma Coll. Winth." is *H. griseola* Fall. 2 ♂, 3 ♀, "fulviceps det. Schiner" are *H.*

*obesa* n. sp. white face variety. 1 ♂, "fulviceps det. Schiner" is *H. sera* n. sp. 4 ♂, "chrysostoma det. Schiner" are *H. griseola* Fall. 1 ♂, "chrysostoma det. Egger" is *H. griseola* Fall. 3 ♂, "chrysostoma det. Schiner" are *H. modesta* Lw.

**Hydrellia flavicornis** (Fallen)

1823. *Notiphila flavicornis* Fallen, Faun. Suec., Hydr., p. 10.
1830. *Notiphila erythrostoma* Meigen, Syst. Beschr., VI, p. 69. (syn. Zetterstedt, 1846.)
1856. *Hydrellia flavicornis* Haliday, Ins. Brit., III, p. 345.

This comparatively large species has the mesonotum, including humeri, blackish, and the pleura not very contrasting. Abdomen shining; that of the males with fifth segment somewhat laterally compressed; the genitalic segments large and generally more or less exserted. Hind tarsi pale basally. The males are easily distinguished by their entirely yellow antennae. The anterior dorsocentrals are absent or undeveloped, the posterior ones strong and very near the sutural region. The females are very similar to those of following species except that the frontalia are not velvety-black in the present species, but concolorous with the mesal area and scarcely differentiated; the mesonotum is more grayish, not so contrasting with the pleura.

In the Vienna Collection I find a male labeled (1) "erythrostoma Coll. Winth.," (2) "Versailles," (3) "erythrostoma" and is the specimen noted by Becker as being *flavicornis* of Fallen. I have labeled it "TYPE, Notiphila erythrostoma Meigen."

Besides the above mentioned specimen I have examined eight specimens from Germany, [Vienna, 6; Deut. Ent. Inst., 2]; and six from Hungary, [Deut. Ent. Inst.].

The synonymy of *erythrostoma* first proposed by Zetterstedt, is substantiated by Becker (1902) and I can concur in this treatment.

**Hydrellia vidua** new species

This may be *H. frontosa* Becker (1926), but the description of that species calls for black palpi although Becker's key to the species of *Hydrellia* in the same work[8] has *frontosa* falling under the yellow palpi division.

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[8] Linder's Fl. Pal. Reg., Fam. 56, p. 63, (1926).

I have not seen the male of the present species, but think the species belongs to the *flavifrons*-group in which the fifth abdominal segment of the males is laterally compressed, not broad as in *griseola*.

Black including antennae; palpi, halteres, middle and hind tarsi, base of fore tarsi, yellow. Wing veins pale.

Medifrons, parafrons, mesonotum, scutellum and abdomen, subopaque, black, overcast with brown pollen, especially the mesonotum. Frontalia opaque black. Lunule and face white, somewhat sericeous. Humeri dark, concolorous with mesonotum. Lower occiput, pleura, venter and legs more or less grayish, but pleura not strongly contrasting with mesonotum. Abdomen very shining, almost polished, of slight metallic tinge.

Face more than one-fourth as wide as head, about twice as long as broad; orbits not strongly flaring below; carina weak; facial profile vertical, slightly convex at middle, lower portion distinctly protruding beyond orbital contour, but epistoma retreating; four to five strong bristles each side, at most two above line of buccal orbits. Cheeks scarcely as broad as third antennal segment; the latter broad apically; arista with seven to eight hairs. Mesonotal bristles strong, but anterior dorsocentrals smaller than the posterior ones and both approximate to the sutural region. Scutellum without fine apical pile. Second and third costal sections subequal. Length, 2.5 mm.

*Type.*—Female; Swinemunde, Usedom Island, Germany, August 19, 1923, (Zerny), [A. N. S. P., no. 6488].

Compared with the type and probably conspecific, is a female from Donnerskirchen, Burgenland, Austria, August 8, (Zerny), [Vienna], and another from Thorda, Hungary, July 20, 1895, [Deut. Ent. Inst.].

### **Hydrellia thoracica** Haliday

1839. *Hydrellia thoracica* Haliday, An. Mag. Nat. Hist., III, p. 402.

This is a yellowish gray species, generally with rather distinct brown mesonotal stripes, especially in the males, and shining abdomen. The black frontalia are overcast with ochreous, which color also obscures the lunule. The palpi and third antennal segment are dark. The arista has six to seven hairs. The posterior dorsocentrals are very near the sutural region, and the anterior dorsocentrals are weak.

Of this species I have seen nine specimens from: Austria, Germany and England, [Vienna; Deut. Ent. Inst.; Collin].

**Hydrellia sera** new species

?1838. *Notiphila nigripes* Zetterstedt, Ins. Lapp., p. 717.

?1844. *Hydrellia nigripes* Stenhammar, Handl. K. Svenska Vet.-Akad., 1843, p. 217. (nec *Hydrellia nigripes* R.-D., 1830.)

This may be *nigripes* (which name, however, cannot be used as it is preoccupied in this genus by Robineau-Desvoidy) but it is practically impossible to recognize that species from Zetterstedt's description. I have received this species from collections determined as *concolor* Stenhammar, *modesta* Loew, and *nigripes* Zetterstedt; and find others in the Vienna Collection labeled "fulviceps, det. Schiner."

The species belongs to the group having the anterior dorsocentrals strong as, and well separated from the posterior pair. The mesonotum including the humeri and notopleura are also dark, almost opaque on account of the coating of rather dense brownish pollen. The face is rather narrow, about one-fifth width of the head, most prominent at middle of its profile, in color golden-yellow; orbits not much flaring below, resulting in comparatively narrow cheeks, which are about one-half as broad as third antennal segment; the latter in the male is yellow to tawny; in the female, brown to black; arista with six to eight well separated hairs. Tibiae black; their tarsi dark with the hind ones generally pale basally. Middle tibiae of male slightly thickened. Abdomen of male rather slender, subcylindrical; fifth segment longer than fourth; sixth visibly protruding; third sternite noticeably large, much longer than wide.

*Type.*—Male; Germany, (Kertesz), [A. N. S. P., no. 6489]. *Paratypes.*—1 ♂; Berlin, Germany, June 12, 1898, (Lichtwardt), [Deut. Ent. Inst.]. 1 ♂; Schildhorn, Berlin, Germany, July 5, 1923, [Deut. Ent. Inst.]. 1 ♂; Mittenwalde, Brandenburg, Germany, August 1, 1899, [Deut. Ent. Inst.]. 1 ♂; "Alte Sammlung, fulviceps det. Schiner," [Vienna].

The following females from: Wannsee, Berlin, Germany, June 2, 1899, [D. E. I., 8], Swinemunde, Usedom, Germany, August 19, 1923, (Zerny), [Vienna, 2], and Ahlbeck, Usedom, Germany, August 14, 1922, (Zerny), [Vienna, 2], are probably conspecific with the above males, but are not considered paratypes.

They are included here on the darker tarsi, relatively longer frons, smaller ocelli, and narrower cheeks, as distinguished from *affabilis* n. sp., *auriceps* n. sp. and *obesa* n. sp. which have fewer number of aristal hairs and the more slender abdomen.

**Hydrellia affabilis new species**

This may be *H. maura* Meigen (1838), but neither Meigen's original description nor Becker's redescription of that species is sufficient for identification. The separation of the present form from the next previous species is very slight, but the series before me is so constant in several characters that it seems advisable to consider that a distinct species is represented; to which, however, I cannot with reasonable certainty apply the name of any heretofore described.

The face (in the series examined) is white, broader and more flaring below than in the previous species, most prominent above middle of profile, and considerably retreating below; cheeks much broader; third antennal segment black in both sexes (if the topotypical female is conspecific). The mesonotum is more shining and the brown pollen less dense. Third abdominal sternite in the male very short. Black, including antennae; halteres lemon yellow; middle and hind tarsi ferruginous; fore tarsi brown.

Frons slightly broader than long; orbits slightly converging. Medifrons and frontalia scarcely differentiated, both appearing unicolorous, opaque black, almost velvety; orbits somewhat greenish or brownish. Lunule and face snow-white to silvery. Latter one-fourth as broad as head, about one-fifth as broad as high, evenly convex, most prominent at or above middle of profile; four to six well separated bristles each side; orbits strongly flaring to moderately broad cheeks, which latter are about as broad as third antennal segment. Arista with seven to eight hairs.

Mesonotum including humeri and notopleura black, subopaque, sparingly dusted with brown; scutellum concolorous. Anterior dorsocentrals as strong as, and well separated from the posterior pair although the rectangle is transverse. Pleura gray; metanotum dark. Abdomen concolorous with mesonotum, subcylindrical; fifth segment of male subconical, rounded apically, slightly longer than fourth. Third sternite very short. Hypopygium not conspicuous.

Middle tibiae in the male not noticeably thickened, and the hairs not unusually long. Second costal section slightly longer than third; posterior cross vein normal. Length, 2 mm.

*Type.*—Male; "Wachtl, Halicia," Galicia, August 18, 1879, (J. Mik), [A. N. S. P., no. 6490]. *Paratypes.*—1 ♂, 1 ♀; topotypical. 1 ♂; Freistadt, Austria, June 17, 1882, (Handlirsch), [Vienna].

Whether or not the color of the face, its high point of convexity, broad cheeks, and the more shining mesonotum, are constant characteristics, cannot be ascertained from the small series represented.

**Hydrellia auriceps** new species

Another form in this difficult group which may prove to be only a variety of the foregoing. The face here is golden while the lunule and cheeks remain white; and this appears to be the main differentiating character of separation. However, the frons is not so intensely black and concolorous, nor the hairs of the legs quite so long and erect as in that species; the tarsi are darker. Length, 2–2.5 mm.

*Type.*—Male; Freistadt, Austria, June 17, 1882, (Handlirsch), [A. N. S. P., no. 6491]. *Paratypes.*—3 ♀; topotypical. 1 ♀; "Wachtl, Halicia," Galicia, Austria, 1879, (J. Mik), [Vienna].

A female collected at Ploen, Germany, July 28, 1898, [Deut. Ent. Inst.], is larger than the type series (3 mm.), but there are apparently no color nor structural differences.

**Hydrellia aurifer** new species

The broad, short, flattened, deep golden colored face, and the flat, quadrate general form of the frons, are very characteristic of this species. I cannot run it to any but *griseola* in published keys. It is apparently allied to *scra* n. sp. described in this paper.

Black; antennae brown, palpi pale, halteres lemon yellow, bases of tarsi brown. Opaque, with abdomen somewhat shining. Frons yellowish gray including the lunule, large, quadrate; orbits noticeably converging; medifrons slightly more shining than the frontalia, elongate, with preocellar bristles distinct. Face dark golden-yellow, sericeous, one-fifth as broad as head, flattened, without carina; orbits slightly flaring below; in profile scarcely visible; three to five bristles in series. Cheeks and occiput gray, former scarcely as broad as third antennal segment. Arista with five hairs.

Thorax and scutellum densely brownish gray; anterior dorsocentrals well developed, forming a transverse rectangle with the posterior pair. Legs normal but setulae noticeably suberect and hair-like. Wings long, with second costal section slightly longer than third.

Abdomen darker above than mesonotum, ovate; fifth segment longer than fourth, narrow, with well developed genitalia exserted. Length, 2 mm.

*Type.*—Male; "Wachtl, Halicia," Galicia, August, 1879, (J. Mik), [A. N. S. P., no. 6492].

**Hydrellia obesa** new species

This species is easily distinguished by the unusual number of aristal hairs, short, ovate, almost rotund abdomen, and the thickened middle tibiae, which latter characteristic is also noticeable in the female.

Agreeing in color with *affabilis* except that the face is golden brown and all tarsi and apices of tibiae are yellow. Frons short, much broader than long; lunule white. Arista with eight to nine hairs. Mesonotum subopaque, sparingly brown dusted. Abdomen almost round in outline, with lateral margins rounded; fifth segment scarcely longer than fourth; second and third sternites quadrate; the others and the genital segments not visible. Second and third costal sections subequal in length; posterior crossveins normal. Middle tibiae in the male very noticeably thickened and the legs clothed with unusually long suberect, curved hairs.

*Type.*—Male; "Austria Coll. Egger," "fulviceps det. Schiner," [Vienna Naturhist. Museum]. *Paratypes.*—1 ♂; "Europa Alte Sammlung," "fulviceps det. Schiner." 3 ♀; "Austria Alte Sammlung," "fulviceps det. Schiner." 1 ♀; Hammern, Upper Austria, August 1, 1872, (Mik), [all Vienna].

**Hydrellia albiceps** (Meigen)

1830. *Notiphila albiceps* Meigen, Syst. Beschr., VI, p. 68.

1830. *Hydrellia argyria* Robineau-Desvoidy, Myod., p. 793. (syn. Macquart, 1835.)

1835. *Hydrellia albiceps* Macquart, Hist. Nat. Ins., Dipt., II, p. 526.

It seems that this species has been little understood, and no doubt many white-faced allies of *griseola* have been determined and recorded under this name. The species is easily mistaken in this respect, but is at once distinguished by the well developed anterior dorsocentrals which are well separated from the posterior ones, the dark humeri, the dark tarsi not contrasting with their tibiae and the weakly convex face.

Meigen's original description may be translated as follows: Similar to *N. griseola,* differing by the pure white face and blackish gray abdomen. The legs are entirely black, halteres white, wings somewhat grayish. From Herrn. Wiedemann.

A male in the Vienna Collection labeled (1) "albiceps Coll. Winth.," (2) "albiceps," probably in Meigen's hand, is in agreement with the above description except that the legs are now brownish due no doubt to fading from age. Becker,[9] in his paper on the types in the Paris Museum, states that the "type" there is synonymous with *nigricans* Stenhammar (1844) which is described as "abdomen aeneo nigrum nitidum . . . Pedes nigricantes, tarsis fuscescentibus. . . ." Meigen calls for the abdomen being "schwarzgrauen . . . Die Biene sind ganz schwarz." The Vienna specimen agrees with Meigen's description, not with that of Stenhammar. We may therefore infer from the above that *albiceps* and *nigricans* are not synonymous and that the specimen before me is probably, at least, a paratype. I have so labeled it. It may be somewhat unconventional to assume this to be a paratype, but we cannot accept Becker's synonymy in view of the discrepancies in the descriptions above mentioned. Furthermore I have recognized as *nigricans* an entirely different species. Until the contrary is proven we can accept the present interpretation of this species.

Black; palpi and probably knobs of halteres (latter missing) yellow.

Head broader than high. Frons much broader than long, anteocellar and interocellar distances subequal; medifrons and frontalia not sharply defined, rather opaque, the latter showing opaque black in certain aspects; ocellars parallel, weak, scarcely as stout as the frontorbitals. Lunule large, broad and snow-white. Face white but not sericeous, broad, about one-half as broad as head, about two-thirds as broad as long, weakly carinate above and weakly convex below, in profile almost evenly convex, slightly more prominent on lower part; orbits not much flaring below; parafacials linear, about six bristles in series extending well below onto the buccal area. Cheeks broad. Antennae (missing), situated well above center-line of eyes. Eyes oblique.

Mesonotum including humeri and notopleura, black, subopaque to almost shining, sparingly dusted with brown; dorsocentrals 1 : 1 subequal, strong and well separated. Scutellum flat. Pleura and pectus opaque gray with dark stain at upper margin of mesopleura. Metanotum dark. Halteres with black-

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[9] Zeit. f. Hym. u. Dipt., II, p. 296, (1902).

ish stalks (knob missing). Legs black to brownish, becoming slightly paler on bases of tarsi; tibiae not dilated. Wings long, brownish, with veins dark; second costal section but slightly longer than third; second vein entering costa with slight curve. Abdomen subopaque, dusted with brown; fifth segment of male subtriangular and convex apically, at most slightly longer than fourth; third and fourth subequal in length. Length, 2 mm.

Under this name in the Vienna Collection I found six specimens as follows: A male to which I have made reference; 1 female "albicans Coll. Winth." which proves to be *H. incana;* another labeled (1) "nigricans det. Schiner," (2) "Germ. Alte Sammlung" is *H. geniculata;* another labeled (1) "nigricans det. Schiner," (2) "Klosterneuburg" is probably an undescribed species, and two specimens of *Hecamede albicans.*

Macquart (1835) apparently correctly identified this species and considered *H. argyria* R. D. synonymous. The original description of the latter is so brief that nothing definite can be gleaned therefrom to guide one in accepting or rejecting this synonymy. Haliday, in his paper on British Hydromyzidae,[10] probably had a composite series under this name. He there suggests *Hydrina fuliginosa* R. D. as a synonym, and again in 1856[11] introduces *H. plumosa* Stenh., not of Fallen, and *H. mutata* Zett. as additional synonyms.

From the above analysis we must therefore eliminate the following records of *albiceps:* Becker's determination of the Paris Museum specimen,[12] his redescription in Die Fliegen der palaearktischen Region,[13] and Czerny's record in his paper on Spanish Diptera,[14] all which probably refer to *nigricans* Stenh. Finally, this species may prove to be *Notiphila albifrons* Fallen (1813) as suggested by Becker in his catalogue.[15] Fallen's species, however, is practically unrecognizable. Besides *albiceps* Meigen, Becker also included *Hydrellia ranunculi* Haliday (1839) as a synonym of Fallen's species.

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[10] Ann. Nat. Hist., III, p. 403, (1839).

[11] Ins. Brit., II, p. 345, (1856).

[12] Zeit. f. Hym. u. Dipt., II, p. 296, (1902).

[13] Lindner, Fl. Pal. Reg., Fam. 56, p. 65, (1926).

[14] Verh. Z.-B. Ges. Wien, LIX, p. 269, (1909).

[15] Kat. Pal. Dipt., IV, p. 197, (1905).

**Hydrellia victoria** new species

This can scarcely be *H. enderbyi* (Hutton) although agreeing in many respects with Tonnoir & Malloch's redescription of the type of that species. I have considered *enderbyi* quite a different species (see page 8). The present species is apparently allied to *sera* but is more shining and the tarsi are black.

Black including the tarsi. Palpi and halteres yellow. Frons opaque in width four times the distance above the lunule to vertical margin; frontalia intense black, but not velvety-black. Face brownish yellow, sericeous, with the linear orbits white, about one-third width of head; in profile slightly prominent on lower half, weakly carinate above, with four to five rather weak bristles in series confined to lower three-fifths. Cheeks and occiput gray; former about as broad as third antennal segment. Antennae black; arista with about six hairs.

Mesonotum including humeri and notopleura unicolorous, black, shining to opaque brown; anterior dorsocentrals very strong and well removed from suture, and forming almost a quadrate with the posterior pair. Pleura and metanotum whitish gray, with upper margin of mesopleura dark. Femora and tibiae gray; tibiae normal. Wings brownish, with second costal section twice as long as third; ultimate section of fifth as long as posterior crossvein.

Abdomen subopaque to shining, slightly metallic tinged and somewhat obscured with brown; apical angles of fourth segment and more of those of fifth, including ventral lobes, conspicuously cinereous; fifth segment slightly longer than fourth, rounded apically; sixth segment narrow; genitalia small. Length, 2 to 2.5 mm.

*Type.*—Male; Victoria, Australia, 1888, [A. N. S. P., no. 6493].
*Paratypes.*—2 ♀ ; topotypical.

**Hydrellia geniculata** Stenhammar

1844. *Hydrellia geniculata* Stenhammar, Handl. Svenska Vet.-Akad., 1843, p. 224.

I recognize this species on the following characters: Face white to yellow, sericeous, broad, flattened and retreating below; cheeks as broad as face above; about five aristal hairs present; dorsocentrals well separated, with the rectangle almost quadrilateral. Abdomen slender, elongate; fifth segment of male twice as long as fourth, very broad apically; sixth very conspicuous, almost one-half as long as fifth, projecting downwards, hood-like, containing the genitalia. Tarsi yellow; second and third costal sections subequal.

I found four specimens of this species without data among the undetermined material from Vienna; one from Ilyria, (Mik), and one determined by Schiner as *nigricans*. A form very similar occurs in North America and is probably conspecific.

**Hydrellia cylindrica** new species

This species is apparently allied to *ranunculi*. It runs to caption 27 in Becker's key[16] but is not either of the two species mentioned, viz. *approximata* and *albiceps*. The anterior dorsocentrals are very strong and well removed from the posterior pair; frons quadrate; abdomen long and slender; tarsi dark.

Black, including tarsi; palpi and halteres yellow. Frons opaque to subopaque, brownish, not broader than long, with orbits converging, narrowly grayish; frontalia not differentiated; lunule small and white. Face with yellow ground color, densely cinereous to white, sericeous, about one-third width of head; in profile, slightly prominent medianly and below; carina very weak; parafacials gray, narrow, scarcely dilated below; four to five bristles in the series on lower half. Cheeks and occiput cinereous; former scarcely broader than third antennal segment; latter brown to pale basally; arista with six to seven hairs.

Mesonotum including notopleura, dark, subopaque to opaque, brownish pollinose; anterior margin, especially humeri, cinereous; anterior dorsocentrals strong, far removed from the posterior pair. Pleura and metanotum densely cinereous. Scutellum concolorous with mesonotum, inclining to gray apically. Coxae and femora cinereous; tibiae and tarsi black to brown; former inclined to paleness basally. Wings brownish; second and third costal sections subequal; ultimate section of fifth vein as long as posterior crossvein.

Abdomen of male long and narrow, subopaque, brownish, becoming gray below; lateral margins rounded; third to fifth segments subequal in length; fifth narrowly rounded and convex apically; sixth and genitalia small and inconspicuous. Length, 2.5 to 3 mm.

*Type.*—Male; Ahlbeck, Usedom, Germany, August 14–22, 1928, (C. Zerny), [A. N. S. P., no. 9494]. *Paratypes.*—1 ♂; Swinemunde, Insl Usedom, Germany, August 19, 1928, (C. Zerny), [Vienna]. 1 ♂; "Coll. Winth."

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[16] Lindner, Fl. Par. Reg., Fam. 56, p. 63, (1926).

**Hydrellia ranunculi** Haliday

1839. *Hydrellia ranunculi* Haliday, Ann. Nat. Hist., III, p. 402.
1914. *Hydrellia ranunculi* Collin, Sc. Proc. R. Dublin Soc., XIV, p. 251.

Through the kidness of Mr. James E. Collin, I have the opportunity of examining specimens which he considered this species after examining Haliday's types. I find they are a species belonging to a group in which the face is broad, rather flattened and flaring below to broad cheeks; the anterior dorsocentrals are strong and well removed from the suture, forming a quadrate with the posterior pair. The following diagnosis will serve to distinguish the species:

Black; third antennal segment of male, palpi, articulation of femora and tibiae, basal segment of tarsi, yellow. Halteres lemon yellow. Frontalia not showing velvety-black in any aspect. Face densely golden-yellow, ground color not noticeable. Mesonotum blackish to faintly grayish with humeri contrastingly gray. Fifth abdominal segment in the male elongate, pointed and convex apically; sixth, rudimentary, present as a narrow sclerite protruding beyond fifth; genitalia large and compressed, concealed by the swollen fifth, anal valves visible and large. Third costal section slightly shorter than second; posterior crossvein more or less oblique, so that the apical superior angle of discal cell is greater than 90 degrees. This obliqueness is generally more apparent in the female, but is somewhat variable.

In the females the third antennal segment is dark but not intensely black; face more whitish than in the males.

I have not seen this species from Continental Europe, and at present can give no additional records of distribution except as regards the four specimens before me from England, received from Mr. Collin.

**Hydrellia fascitibia** (von Roeser)

1840. *Notiphila fascitibia* von Roeser, Wurtemb. Korresp. 1840, p. 62.

A densely cinereous species with the dorsum of the abdomen brown; tibiae and tarsi yellow, except a brown median ring on hind tibiae which is sometimes wanting. The bristling is strong and the dorsocentrals form a slightly elongate rectangle with each other.

The three specimens before me appear to be females: two from Bregrenz, Austria, July 29, (Handlirsch), [Vienna]; one from Vienna, September 15, (Mik), [Vienna].

## OCHTHERA Latreille

This genus is so well known, by the raptorial forelegs, that no further characterization is necessary. Very good specific characters may be found in the relative lengths of the fore tibia and its spur; in the peculiar development on the apical flexor angle of the fore metatarsus of some males; and in the relative width and length of the face above the median tuberosity, as well as in the development of the tubercle itself.

### **Ochthera mantis** (DeGeer)

This species is apparently Holarctic in distribution. I have not seen it from more southern localities.

In the Vienna Collection there were thirty-five specimens correctly determined by Wiedemann, Meigen, Schiner, Frauenfeld, and Bergenstamm mostly from Austria, and two females from Mehadia, Auyanm (Mann, 1859), "Alte Sammlung," which proved to be *pilimana* Becker. Among the undetermined material from Vienna I found twenty-one specimens from Austria and Bohemia.

### **Ochthera pilimana** Becker

1903. *Ochthera pilimana* Becker, Mitt. Zool. Mus. Berlin, II, p. 181.
1931. *Ochthera canescans* Cresson, Ent. News, XLII, p. 168.

In this species we have the general facial build of *mantis*, but the palpi are pale; the abdomen rather uniformly cinereous through which the metallic green or bronze ground color appears; and the fore tibial spur is much longer.

That this is synonymous with *schembrii* Rondani I very strongly suspect, but not having seen any specimens of that species as recognized by Becker,[17] I cannot give any more definite opinion. The only marked difference, according to Becker, is that the present species has the hind tarsi of the male ciliate with long well spaced hairs which are lacking in *schembrii*. The color of the lateral setae on the second abdominal segment of the females is not a very definite character, as I have seen instances where both pale and black setae are intermixed.

Both *schembrii* and *mantispa* were described in the same year, 1847, the former in March, the latter in December, which gives

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[17] Lindner, Fl. Pal. Reg., Fam. 56, p. 50, (1926).

*schembrii* priority. The synonymy of *canescens* Cresson, described from Formosa, is apparently correct, although there seem to be some slight differences which however cannot be considered of specific or subspecific value. The present species may be characterized as follows:

Black; palpi, halteres, fore and middle tarsi except apices, hind tarsi except bases and apices, pale. Face uniformly clothed with dull ochreous to sericeous white pollen, without any shining denuded area above tubercle; width at antennae as broad as length from frontal margin to apex of bicuspidate tubercle. Tormae of male at least as broad as long, rather rounded apically; of female more triangular and pointed. Abdomen uniformly cinereous, but not densely enough to obscure the green or bronze metallic ground color; the ventral lobes of the tergites however become entirely opaque; seldom any trace of a dark median dorsal line except on basal segments. Fore tibial spur distinctly more than one-half as long as extensor length of tibiae; fore metatarsus pale, of male as long as tibial spur, much dilated apically, with the apical flexor angle polished black, produced as a shining black cone about one-half as long as next following segment, almost obscured by long flexuous hair. Two basal segments of hind tarsi of male with lateral flexor cilia of rather long, well separated, apically curved hairs.

The above notes and diagnosis are based on one male and ten females from Port Said, Egypt, and Island of Sokotra, determined by Becker; and two females from Mehadia, Hungary, (Mann, 1859), which I found under *mantis* in the Vienna Collection.

**Ochthera praedatoria** Loew

1862. *Ochthera praedatoria* Loew, Ofv. Sv. Akad. Forh., xix, p 14.

Another member of the *mantispa*-group, but the abdomen not so uniformly coated as in *pilimana*, with almost shining, dark basal bands on the segments. The palpi are pale, which distinguishes it from its associate, *chalybescens*. The fore metatarsus of the male has the long black apical bristles somewhat as in *pilimana* but there is no conical development of the flexor angle.

The species was originally described from "Caffraria" and is apparently confined to the southern part of Africa. The following localities are represented in the material before me:

"Cap," [Vienna; one male found in the undetermined series]. Middleburg and Pretoria, Transvaal, [Transv. Mus., 2]. Dohne and East London, Cape of Good Hope, [Transv. Mus., 2]. Bloemfontein, Orange Free State, [Transv. Mus., 2].

**Ochthera insularis** Becker

1910. *Ochthera insularis* Becker, Denks. Akad. Wiss. Wien, LXXI, p. 154.

This species was described from one male and sixteen females from the Island of Sokotra, off the southern shore of Arabia. In the Vienna Collection I found the type series containing one male and eight females, from which series I have selected and labeled the male as the type; the others are considered paratypes, and are all in good condition.

The species is very similar to *chalybescens* Loew, as I recognize that species, from South and Central Africa. It, however, averages larger, with broader face and correspondingly broader tubercle in which the distance between the cusps is about equal to the width of the third antennal segment. The fore metatarsus of the male is less dilated apically, with the flexor depression small and circular and the long hairs from same, shorter and not converging. The middle femora have a post-flexor proximal series of seven to eight long bristles. The females show much less differentiation but are readily distinguished by the broad face and facial tubercle. This and *chalybescens* are separated from those in the *mantispa*-group by the dark shining abdomen with only the lateral angles of the segments cinereous.

The species has not been recorded from other than its type locality.

**Ochthera chalybescens** Loew

1862. *Ochthera chalybescens* Loew, Ofv. Sv. Akad. Forh., XIX, p. 14.
1905. *Ochthera subtilis* Adams, Kans. Univ. Sci. Bul., III, p. 180. (syn. Bezzi, 1908.)
1908. *Ochthera chalybescens* Bezzi, Bull. Soc. Ent. Ital., XXXIX, p. 189.
1922. *Haplochila chalybescens* Enderlein, Konowia, I, p. 127.
1922. *Ochthera mantispa* Becker, Denks. Akad. Wiss. Wien, XCVIII, p. 72.

This species has the abdomen shining black, sparingly brown dusted, with cinereous lateral spots. The face silvery to yellowish; tormae projecting, acutely triangular; tarsi of varying tones of tawny; fore metatarsus of the male with dilated apex where there is a flattened flexor area more or less concealed by long hair, the longest of which, about five in number, converge and twist together at their tips.

There seems to be considerable variation in form of the facial tubercle. In some specimens it is quite conical, without cusps; in others the cusps are separated and with a flattened area above as well described by Enderlein in his description of *speculifera*. However the series before me show all intergradations in this character. I do not think Enderlein's genus *Haplochila*, erected for his new species *speculifera* and those having the long pointed tormae as distinct from the rounded form of *mantis*, will stand; my material shows this as a variable character. On the other hand, Enderlein omits the most valuable character, the fore metatarsal tuft of the males. Or is this character absent in his species?

The species was originally described from Cape of Good Hope, and again as *subtilis* from Rhodesia. I recognize it from: East London, Cape Province, [Transv. Mus., 2]. Barberton, Transvaal, [Transv. Mus., 3]. Mto-ja-Kifaru, Kenya, [Hung. Nat. Mus., 2]. Dr. Bezzi records it from Eritrea, and Becker from Egypt. I cannot substantiate these two last records.

**Ochthera brevitibialis** Meijere

1908. *Ochthera brevitibialis* Meijere, Tijds. v. Ent, LI, p. 167.

I recognize this species from Meijere's description of the fore metatarsus of the male being ciliate beneath and with three long hairs; which character will separate this from the next following species.

The present species is readily separated from *pilimana*, as occurring in Formosa, by the dark, shining, sparingly dusted abdomen. It is separated from *rotunda* by the broader face and the modified metatarsus of the male. Here we have the face at the antennae narrower than its length from frontal margin to apex of the approximated cusps of the median tubercle; facialia well defined as in *mantis*, but not as broad. The abdomen is somewhat shining, sparingly brown dusted, with lateral apical angles of segments markedly cinereous, which sometimes encroaches onto the dorsum of segments five and six. Fore tibial spur long and slender, as long as the tibia and longer than the metatarsus; the latter with a shining black apical flexor conical tooth almost concealed by long hairs, and with four to five longer hairs at its apex.

The species was originally described from Semarang, Java. I have seen material from: Sumatra, [A. Thienemann, 18]; Los Banos, Philippine Islands, [Baker, 3].

**Ochthera circularis** Cresson

1926. *Ochthera circularis* Cresson, Trans. Am. Ent. Soc., LII, p. 254.

The separation of this from *brevitibialis*, as I recognize that species, is easy as regards the males when the differences in the modification of the fore metatarsus are considered; as regards the females however, we may have some difficulty. In the females of *brevitibialis* the scutellum is quadrate, the fore tibial spur is distinctly longer than the metatarsus, almost as long as the two basal tarsal segments together. In *circularis* the scutellum is broader and the spur is scarcely as long as the metatarsus. The study of larger series than I have will probably give us more definite characters for separation.

Besides the type series from Formosa, Philippine Islands and Java, I have seen material from: Amboina, (Doleschal, 1859), [Vienna, 1]; "India orientale," [Vienna, 1]; Peradenija, Ceylon, (A. Rutherford; Dec. 25, 14), [London, Imp. Bur. Ent., 1].

**Ochthera sauteri** new species

This species is very similar to *O. circularis* Cresson also described from Formosa, but several structural characteristics, especially of the males, certainly mark it as a different species. Here we have a similar modification of the basal segment of the fore tarsi of the male but the depressed shining area is elliptical, not circular, and bears a longitudinal series of bristle-like hairs which converge and twist together at their tips. In *circularis* there is, instead, a short but distinct cone, bearing a fewer number of similar hairs. The hind metatarsus is less dilated and the second segment is comparatively longer than in *circularis*. The females of the two species are rather difficult to separate, but in the present one the facial tubercle is less prominent, palpi darker, and the scutellum broader than long.

*Type.*—Male; Pilam, Formosa, (H. Sauter; VII, 1912), [Deutsch. Ent. Inst. Coll.]. *Paratypes.*—1 ♂, 2 ♀, topotypical;

1 ♀, Kankau, Koshun, Formosa, (H. Sauter; VII, 1912), [Deutsch. Ent. Inst.].

**Ochthera margarita** new species

In this species the face is not strictly tuberculate, but simply convex medianly, thus simulating the American *lauta* Williston, *exculpta* Loew and allies, and probably belongs near that group. It differs from all known species by the uniformly iridescent pearly appearance of the face.

Black; tips of palpi, all tarsi and halteres, yellow; fore and middle tibiae, bases of hind tibiae, tawny to brown; third antennal segment brown. Wings clear hyaline, with pale veins. Medifrontal plate polished, with slight metallic tints; the narrow opaque velvety black orbits not attenuated above. Face uniformly pearlaceous (under high, 117 diameters, clothed with metallic blue and green scales); tormae concolorous; the narrow orbits white; lower occiput silvery. Mesonotum aeneous, with bronze, coppery or bluish areas depending upon the angle of vision, becoming metallic silvery on the humeri and pleurae. Scutellum bluish, granulose. Abdomen almost smooth, shining, sparingly brown pollinose; segments two to five with lateral subapical cinereous bands, becoming dense and silvery on the ventral lobes. Femora cinereous but not completely obscuring the metallic tints.

Frons broader than long, slightly depressed; inner verticals absent, ocellars weak. Face twice as broad as third antennal segment, rather evenly convex in profile, no prominent median tubercle; medifacial grooves evident below; foveae weak; tormae subtriangular, as long as broad. Scutellum flat, about as broad as long, with slightly convex apical margin; apical bristles on small tubercles, closer together than the length of the bristle. Abdomen slightly elongate; lateral margins rounded, not acute; hypopygium small. Fore tibial spur nearly as long as the tibia, longer than the simple metatarsus. Middle tibiae slightly flattened and polished on anterior extensor surface apically. Hind metatarsus slightly thicker than the tibia. Wings with the posterior crossvein forming a distinct angle with ultimate section of fourth vein. Length, 3.3 mm.

*Type.*—Male; "India O." [East Indies?], (Dr. Uzel), [A. N. S. P., no. 6495]. *Paratype.*—1 ♀, Gordonvale, North Queensland, Australia, [U. S. Nat. Mus.].

**Ochthera rotunda** Schiner

1868. *Ochthera rotunda* Schiner, Reise Novara, Dipt., p. 243.
1911. *Ochthera harpax* Meijere, Tijds. v. Ent., LIV, p. 390. [new syn.]

In this species we have a very narrow face at the tubercle, scarcely twice as broad as third antennal segment; the tubercle conical, forming the upper part of the longitudinal median carina; the facialia not differentiated. Fore tibial spur as long as its tibia.

The description of *harpax* is in perfect agreement with the type series of the present species. It was originally described from Java.

The Vienna Collection contains three males labeled (1) "Novara-R. Nicobaren," (2) "rotunda Alte Sammlung." These are in good condition, and one of these I have labeled "TYPE"; the other two are paratypes. I have not seen any other specimens of this species.

# STUDIES IN THE TENEBRIONID TRIBE SCAURINI: A MONOGRAPHIC REVISION OF THE EULABES

## (COLEOPTERA)

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(Plates I to VI)

The heteromerous Coleoptera belonging to the Tenebrionid Tribe Scaurini forms a moderately large group of species, inhabiting both the old and new world. Those of the latter are divisible into two subtribal sections—the Cerenopi and Eulabes. The Eulabes are peculiar to the extreme south-western United States, Lower California and the islands adjacent to the west coast. In California one species, at least, occurs as far north as 41 degrees north latitude (Shasta County); another has been collected as far south as 30 degrees north latitude (San Martin Island). On the main land the species are confined to the region west of the summit of the Sierra Nevada Mountains and, in the extreme south, west of the true desert regions, in the latter regions occur the closely related Cerenopi. Two species range to an altitude of 9,000 to 10,000 feet. There is no authentic record of any species having been found to inhabit the adjacent regions of Nevada and Arizona. There is, however, in the collection of the Academy of Natural Sciences of Philadelphia, a specimen labeled "Nev."; if this is an authentic record, it can be a case of distribution through commerce. In the same collection is a specimen labeled "Tampa, Fla."—this surely must be a mistake. At any rate, before such records can be accepted as authentic, other specimens must be collected in those regions.

A study of the primary genital characters has been made whenever material would permit of it. The terminology used in the study of the aedeagi will be that used by the author in his Monograph of the Eleodiini,[1] as it is very convenient for purposes of description. Attention will also be directed to certain problems in homology. Such studies are absolutely necessary for the consideration of specific, generic and phyllogenetic relationships. It is, furthermore, desirable to correlate the terminology used by Vasco M. Tanner in his studies of the genitalia of the female Coleoptera[2] with that of the author.

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[1] Bull. U. S. Nat. Mus, 63, (1909).

## TECHNIQUE

The aedeagi can best be studied as opaque objects, as the surface contour and sculpturing are best retained in that way for description. Freshly collected specimens are preferred, especially after they have been placed in 70 per cent alcohol, where they should remain for a week or two; by such treatment the tissues undergo fixation and the genital segments may be more or less protruded and readily accessible for study. If dried mounted specimens are used, they must be softened by being immersed a minute or two in water that has been brought to the boiling point. The larger specimens should remain longer in the hot water. When specimens have the aedeagus exposed, simply submerging the posterior part of the insect is sufficient as there is an advantage in having the specimen held fast to the pin; this treatment does not apply to the microcoleoptera. Unmounted material can be prepared under a dissecting microscope or held between the fingers according to size. After a specimen has been softened the last abdominal sternite can be depressed and the genital segment hooked out with an insect pin which has had the point bent to form a very small hook; the enveloping membranes should be carefully dissected away and in most instances the anal canal as well so as to fully expose the aedeagus.

Specimens can be mounted for microscopical study and drawing in one of two ways: (1) On a card-board slide, after careful brushing to remove excess of fluid or dirt which obscures the sculpturing. A very slight amount of an adhesive is necessary: one centimeter of water to which has been added a drop of glue answers the purpose; the slide can be varnished with the solution in a small area, it dries quickly and where the specimen is to be placed a small spot can be moistened with a very slight touch of water. Place the specimen and orient it quickly in the desired position. After a camera lucida drawing has been made and the details noted, remove by simply wetting slightly with water, when in a second or two it can be lifted off, given a bath and remounted. The process can be repeated as many times as necessary to view the specimen in as many different positions as desired. (2) By mounting under water in a watch crystal. To do this a slight speck of thick Canada balsam is placed on center of the glass and the specimen oriented as lightly as possible on edge of the balsam, and very carefully cover with water. To unmount pour off the water, apply a drop of xylol, wash in alcohol, return to water; remove excess of water with a small soft camel-hair brush, reorient on the balsam as before. The process can be repeated as many times as necessary to study the specimen in all positions. It may be mentioned in passing that softening the tissues in very hot water restores them to nearly their normal fulness.

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[2] Trans. Am. Ent. Soc., LIII, pp. 17–19, (1927).

Specimens cleared with potassium hydroxyl show the sclerites and more obvious details, but are not entirely satisfactory for the study of surface contour and the less obvious details of sculpturing. When the study of the aedeagi have not been completed, or they are not for immediate use, they should be placed in a solution of equal parts of glycerine and water to which has been added a drop or two of phenol, this immersion of the tissues insures against mould and retards evaporation while under observation. The aedeagi of microcoleoptera can be transferred from the solution to a glass slide under a coverglass with as little pressure as possible; this can be controlled by placing some object of equal thickness under the coverglass with the specimen.

All descriptive details have been drawn up under a magnification of six diameters. Camera lucida drawings have been made at a magnification of twenty-five, thirty-four, thirty-eight and sixty-six diameters according to the size of the specimens, reduced to one-third on the plates. The aedeagi have been studied under all angles of illumination in order to properly recognize and verify the characters to overcome optical illusions.

## SCULPTURAL CHARACTERS IN THE EULABES

In the Eulabes the surface of the body is extremely finely and microscopically reticulo-granulate, especially that of the elytra. Each elytron is 9-striate including the submarginal stria; each stria consists of a single row of punctures, occasionally with very few scattered punctures which appear to be vestigial of the parastrial series present in *Apsena grossa* Lec. (Pl. I, fig. 1.).

Each elytron is 9-costate. The costae are formed by elevation of the interstrial surface; the first or sutural, second and third are the least elevated and in the species of the *pubescens* group the first is always absent, except a remnant lateral to the scutellar area; laterally they become increasingly more prominent, as a result the intervals appear correspondingly more concave according to the height of the costae; in two species the costae are nearly obsolete. The second, fourth, sixth and eighth costae do not attain the basal margin of the elytra; the first is parasutural and arcuately diverges basally to join the basal margin laterad to the scutellum, the post-scutellar surface is somewhat impressed; the seventh and ninth costae may or may not unite a short distance behind the humeri to form a short common humeral costa. Frequently all of the costae are more or less atrophic or fragmented before the elytral apex and are more or less represented by tubercles or asperities. Occasionally the first and second costae, in one species the third as well, are quite entire, that is, they terminate at the narrow submarginal impressed area at apex.

Each costa (See Pl. I) is smooth and glabrous on the crest, forming a smooth line or carina The carinae vary slightly in width and regularity of the margins in the different species. Each carina has a series of very widely spaced punctules which are more or less very minutely setigerous. Series of small paracarinal punctures are present in all of the species, either against or a short distance removed from the carinal margins; these punctures have some taxonomic significance. It is from these paracarinal punctures that the long hairs arise in the pubescent species. Generally the punctures are simple and if muricate, never more than slightly so on the declivous surfaces of the elytra.

Each puncture bears a seta or hair; the setae are usually very minute in part of the species, on the pronotal disk they are moderately long and stout in the other species, less stout on the under surface of the body. On the labrum each puncture bears a short erect hair; the hairs on the prosternum are long and flying.

The epipleural base may be margined or more or less rounded. In one species the margin is prominent anteriorly and excavated within to accommodate the basal pronotal angles. In part of the species the lateral pronotal margin is flush with the plane of the propleural surface, in others projecting beyond and appearing moderately explanate (Pl. V, figs. 16 and 17.).

The prosternal process is either quite evenly arcuate between the coxae, or less so and more or less feebly mucronate at apex and more or less flush with the posterior prosternal margin.

The propleurae are more or less rugoso-punctate; the punctures may be exposed and distinct or small and obscured; in the latter case being situated on the upper surface of the rugae. In the majority of the species the rugae are fragmented in the submarginal area beneath the pronotal margin, each fragment forming a somewhat crescentic or lunate lower margin of a puncture; these lunate tubercles are shining, discrete or crowded in the submarginal area, sometimes absent in a narrow area against the pronotal bead. In one group of species the rugae are rather fine and reticulate with the punctures in the meshes in the submarginal area.

The under surface of the body is very coarsely punctate in all of the species; on the parapleurae the punctures are round, shallow and more or less coalescent or discrete; on the prosternum coarse with more or less coalescence, or shallow, less defined and somewhat asperate. The metasternal epimera are large, distinctly defined, coarsely punctate in all of the species except one, where they are impunctate (Pl. V, figs. 12, 13, 14 and 15.). The mesosternal epimera are more or less feebly defined.

In the Eulabes the mentum is trapezoidal, more or less trilobed and presents two types of structure. The middle lobe is well developed and the lateral lobes correspondingly small in part of the species; atrophic in others and the lateral lobes broadly exposed and not well defined. A median carina is present in all the species and differs more or less in degree of development. In two species the carina is modified to form a truncate tubercle in the male, but remains unmodified in the female. The surface is more or less biimpressed, the two foveae separated by the carina, and the sculpturing variable according to the species.

## GENITAL CHARACTERS OF THE EULABES

The aedeagus of the male consists of the edeagophore,[3] which is more or less flax-seed-shaped as viewed from above, more or less flattened dorso-ventrally, usually well chitinized and more or less arched, especally in basal third; consisting of two segments, a basal or basale (valvifer-Tanner) and an apical or apicale (united coxites[4]) (Pl. IV, fig. 8.). The edeagophore is the bearer of the intromittent organ which is ensheathed within the ventral part of the apicale.

The apicale is triangular, more or less depressed dorso-ventrally, glabrous and presents for description an apex, base, superior and inferior surfaces and two lateral borders; the dorsal sclerite is continuous with the inflexed sides which form the ventral surface and meet at a median suture, between which is a suboval aperture, the genital fissure, which is filled by the intromittent organ in the position of retraction. The latter is flattened and ligulate in form (Pl. IV, fig. 15.), its base is produced forming two chitinous processes which give attachment to the muscles of retraction and protrusion.

The basale is elongately semi-cylindrical and moderately depressed, more or less arcuate, usually strongly arched in basal third; membranous beneath between the inflexed sides of the dorsal sclerite (Pl. V, figs. 3A, 3B and 3C.).

The aedeagus of the female consists of an apical or essential segment, which is triangular in outline, and a basal segment or valvifer. The apical segment consists of two lateral parts or valves which are well chitinized and capable of abduction and adduction, medially these are continuous with the intervalvular or superior and inferior pudendal membranes, which form the vulva and between which courses the oviduct. Each valve (coxite) presents for description a dorsal and a ventro-lateral surface, apex and appendage (stylus). Dorsal to the genital segment is the anal segment, which according to Tanner is developed from the tenth tergite or proctiger. The aedeagi of both sexes present in the different species sculptural and morphological characters of taxonomic and phyllogenetic value. For a striking example of a tribal morphological difference, note that in the Eleodiini[5] (Pl. IV, fig. 8.) the male intromittent organ gives attachment to two lateral processes (clavae) which are capable of abduction and adduction; no such structure exists in the males of the Eulabes. In the Eleodiini the ventro-lateral walls of the valves are entire and not divided into sclerites by transverse sutures as in the Eulabes. Such differences in structure constitute marked tribal differential characters and indicate the goal of the present studies. According to Tanner the valves (coxites), appendages (styli) and basale (valvifer) are developed from the ninth abdominal sternite.

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[3] A Monograph of the Eleodini, Bull. 63, U. S. Nat. Mus., p. 20, (1909).

[4] Trans. Am. Ent. Soc., Phila., LIII, pp. 17–19, (1927).

## HOMOLOGY

In certain coleopterous families the genital segment is bivalvular in both sexes. For example, this is true in *Hydrous triangularis* Say.[5] As higher specialization is attained the two valves (coxites of Tanner) unite to form the apicale of the edeagophore of the male, as exists in the Tenebrionidae. Proof of such union is very evident in the Blaptini[6] and Eleodiini; also, well indicated in the Eulabes. Such evidence lies in the dorsal and ventral median grooves and corresponding emarginate apex of the apicale (united coxites of Tanner, or inner lobes of Packard) supported by the basale (valvifer of Tanner, or united outer lobes of Packard.).

## ACKNOWLEDGMENTS

The author is indebted to the following institutions for the loan of material: Museum of the California Academy of Sciences, which includes the collections of E. C. Van Dyke, J. O. Martin, Albert Koebele, Louis S. Slevin and that of the author; Academy of Natural Sciences of Philadelphia, which includes the collection of Geo. H. Horn; that of the Entomological Department of the University of Kansas, which contains the collections of F. H. Snow and Warwick Benedict. One hundred and fourteen specimens from the United States National Museum, which include the collections of A. E Schwarz, H. G. Hubbard, D. W. Coquillett and C. V. Riley. Mr. Henry Dietrich of the State Plant Board of Lucedale, Miss., loaned a series collected while he was on the western coast. Mr. E. R. Leach submitted a small series of a new species, and Mr. Chas. Liebeck of Philadelphia sent his very interesting series.

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[5] See Bull. 63, U. S. Nat. Mus., pp. 24–25 and Pl. 9.

[6] *Blaps* Fab.: Bull. 63, U. S. Nat. Mus., p. 25, Pl. 9, figs. 3 and 4.

Special appreciation and thanks are extended to the following persons for negotiating the loans or for the contribution of valuable notes: Chas. Liebeck, E. T. Cresson, Jr. of the Academy of Natural Sciences of Philadelphia, Edw. A. Chapin and H. G. Barber of the United States National Museum and Warwick Benedict of the Entomological Department of the University of Kansas.

Part of the author's material, other than that collected by himself, is that of the collection of Mr. O. N. Sanford, a pioneer entomologist of San Diego, California, which was obtained by purchase in 1891.

## TRIBE SCAURINI

Body more or less elongate, apterous. Head prolonged behind the eyes, the latter transverse, reniform and coarsely faceted; front more or less dilated at the sides and anteriorly; labrum more or less covered, being retractile beneath the epistoma; mentum small, with small more or less inflexed lateral lobes, ligula prominent, gular peduncle distinct; palpi with the last joint dilated and triangular (Pl. I, figs. 11 and 15; pl. V, figs. 10 and 11.). Antennae 11-joined, outer joints usually broader, rounded and more or less transverse.

Elytra not embracing widely the flanks of the abdomen; epipleurae narrow, attaining the elytral apex; mesosternum very short, side pieces narrow, epimera distinct. Abdomen with the hind margins of the third and fourth ventral segments coriaceous, third and fourth segments more or less emarginate at apex and the basal margins of the fourth and fifth segments narrowly and deeply impressed. Anterior coxae rounded; middle coxae with distinct trochantine; hind coxae oval, very widely separated. Tibial spurs distinct or large, tarsi coarsely spinous beneath. Scutellum transverse, not penetrating between the elytra.

The American species belonging to the Tribe Scaurini are divisible into two subtribal groups as follows:

Head much longer than wide

Third antennal joint long, joints four to eleven gradually diminishing in size and width, terminal joint acute at apex. Intercoxal process of first abdominal segment broader than long, the segment equal to the second and third; third and fourth segments very short and deeply emarginate at apex. Femora of the male toothed and strongly clavate. . Cerenopi

Head short

Third antennal joint more or less moderately elongate; joints four to eleven subequal in length, outer joints more or less transverse; last joint rounded at apex; intercoxal process longer than broad; first abdominal segment not longer than the two succeeding; third and fourth segments feebly emarginate at apex; femora mutic and never suddenly clavate. Eulabes

## SUBTRIBE EULABES

The genera may be characterized as follows:

### *Generic Synopsis*

Elytra distinctly costate, irregularly margined at base; eyes narrowly reniform; metasternal epimera coarsely punctate.

Pronotum bicarinate; mentum tuberculate in the male, carinate in the female, middle lobe atrophic, lateral lobes broadly exposed; sutural costae of elytra always present; last joint of antennae as wide as long, as wide or slightly wider than the tenth; tarsi moderate in structure. *Eulabis* Esch.

Pronotum not carinate. Middle lobe of the mentum well developed, carinate in both sexes, lateral lobes small; last four joints of the antennae distinctly transverse; tarsi more or less robust . . . . . . . *Apsena* Lec.

Elytra not margined at base, costae obsolescent; metasternal epimera impunctate; eyes larger and reniform; mentum tuberculate in the male, carinate in the female, middle lobe very atrophic to obsolete, apex truncato-emarginate. *Epantius* Lec.

All of the species, with one exception (*Epantius*), are more or less myrmecophilous, either frequenting ants' nests or in their vicinity. The species prefer to live under stones which have not been disturbed and fixed to the soil. This does not signify that they may not also be found under loose objects which they happen to come upon, during their nocturnal travels. They avoid sunlight and have been observed traveling about on dark or cloudy days. *Epantius* is an exception and strictly littoral in habitat.

### *Subtribal Genital Characters*

At the present time the subtribal genital characters can only be tentatively stated, as more extended and comparative studies are absolutely necessary before they can be known and tabulated.

It is not expected that the genital characters can be used for the practical identification of species; but they are absolutely essential to the study of the relationship of species and phyllogeny.

Male.—Edeagophore more or less elongately flax-seed-shaped, as viewed from above, depressed dorso-ventrally and more or less arched, usually strongly so basally. Apicale triangular, with a dorsal groove more or less distinct, apex feebly emarginate. Intromittent organ without clavae. (Pl. V, figs. 3A, 3B, and 3C.)

Female.—Ventro-lateral plate of each valve of the genital segment divided by two transverse sutures into three sclerites. (Pl. VI, fig. 2.)

### **EULABIS** Eschscholtz

1829. *Eulabis* Eschscholtz (von ἐυλαβης, vorsichtig.) Zool. Atlas, III, p 14. [Genotype: *bicarinata*.]
1848. *Eulabis* Solier, in Baudi et Truqui, Studi Ent., p. 257, pl. 11, fig. 1.
1859. *Eulabis* Lacordaire, Hist. Nat. d. Ins., Gen. des Col., Paris, v, p. 133.
1870. *Eulabes* Horn, Proc. Am. Philos. Soc., XIV, p. 323. (Revis. Tenebr.)
1883. *Eulabes* Horn and LeConte, Smiths. Misc. Coll., 507, p. 375. (Class. Col. Amer. N. Mex.)
1891. *Eulabes* Casey, Ann. N. Y. Acad. Sci., VI, Nov., p. 59. (Col. Not., III.)

Body depressed; sides of the pronotum (Pl. I, fig. 20.) rather narrowly explanate and more or less moderately reflexed, disk bicarinate. Lateral lobes of the mentum (Pl. II, figs. 14, 15 and 16.) broadly exposed, middle lobe atrophic and differing in the sexes. Antennae (Pl. II, fig. 6.) gradually incrassate apically, third joint a little elongate, about a third longer than wide; outer four joints transverse. Eyes (Pl. I, fig. 19.) transverse, narrowly reniform. Elytra margined at base, 9-costate not including the marginal and 9-striate; scutellum marginal. Epipleurae attain the elytral apex, upwardly uncinate at base, attaining the summit of the humeral angle; basal margin prominent anteriorly and concave within to receive the basal pronotal angles.

In the male the mentum is tuberculate, tubercle (Pl. II, figs. 14 and 15.) prominent, round, truncate and plane at apex; in the female simply carinate (Pl. II, fig. 16.), the carina is median and most prominent at apex.

Genotype: *Eulabis bicarinata* Eschscholtz.

In 1859, Eschscholtz defined the genus *Eulabis* and referred two species to it, namely: *bicarinata* and *rufipes*. The former was described first and has priority as genotype. At the present time *rufipes* Esch. not being a true *Eulabis* is referred to the genus *Apsena* Lec.

### *Generic Genital Characters*

Male.—Edeagophore moderate in length, quite evenly flaxseed-shaped when viewed dorsally. Apicale very moderately convex on dorsum, groove more or less entire, apex feebly emarginate; ventral surface not prominent. Basale moderately strongly arched in basal third. (Pl. VI, figs. 3A, 3B and 3C.)

Female.—Genital segment evenly triangular. Dorsal plates of the valves narrowed apically, surface quite plane; a stylifer present forming apex, appendages cylindrical and about twice as long as wide. Ventral sclerites closely united at the sutures, apical suture arcuate, median borders of the valves more or less straight. (Pl. VI, figs. 1 and 2.)

**Eulabis bicarinata** Eschscholtz.

1829. *Eulabis bicarinata* Eschscholtz, Zool. Atlas, III, p. 15, pl. 14, fig. 8.

1848. *Eulabis bicarinata* Solier, in Baudi et Truqui, Studi Ent., p. 257, pl. 11, fig. 1.

1859. *Eulabis bicarinata* Lacordaire, Hist. Nat. d. Ins, Gen. des Col., v, Paris, p. 133.

1870. *Eulabis bicarinata* Horn, Am. Philos. Soc., XIV, p. 324. (Revis. Tenebr.)

1891. *Eulabis bicarinata* Casey, Ann. N. Y. Acad. Sci., VI, p 59, Nov. (Col. Not., III.)

Form oblong, elongate, slightly narrowed anteriorly, moderately depressed and a little more than twice as long as wide. Color piceous to nigro-piceous; antennae and legs dark rufopiceous. Pubescence very minute throughout. Luster dull.

Head about as long as wide (Pl. I, fig. 17.), widest across the anterior canthi; sides noticeably arcuate and moderately convergent anteriorly, feebly notched at the oblique sutures and slightly reflexed; epistoma about half the length of the visible head, apex slightly arcuate, angles broadly rounded; frons moderately convex, rather broadly impressed along the sutures and slightly at middle between the eyes, coarsely and deeply punctate, punctures scarcely coalescent, more discrete, less deeply impressed and smaller along the margin. Labrum transverse, declivous apically, emarginate at middle of apex and with a dense fringe of golden pubescence each side along the margin. Eyes (Pl. I, fig. 19.) moderately larger and longer than in *Apsena* Lec., coarsely faceted. Mentum (Pl. I, figs. 14, 15 and 16.) of the male has the middle lobe represented by a prominent truncate tubercle. In the female the middle lobe is represented by a small triangular projection at middle third of the apex; lateral lobes broadly exposed and not defined internally, carina narrow and most prominent at apex where it is slightly thickened; surface scarcely impressed lateral to the carina toward base and simply subscabrous. Ligula trapezoidal between the insertions of the labial palpi, apex feebly emarginate to straight, fimbriate with short closely placed hairs, surface very feebly convex and glabrous. Second joint of the maxillary palpi (Pl. I, fig. 11.) obconical and twice as long as the third, fourth oblique at apex; the lateral border nearly twice as long as the inner. Antennae (Pl. II, fig. 6.) moderate in length, about attaining the pronotal base, moderate in stoutness, gradually but not strongly incrassate, first joint about as long as wide, equal in length to that of the fifth to the tenth inclusive, exclusive of the condyles; third elongate, two-thirds longer than the first, fifth to the tenth inclusive about equal in length including the condyles, fifth to the eighth inclusive equal in width, eighth to the tenth gradually transverse, tenth about a third wider than long, eleventh rounded, not wider than the tenth; joints seventh to eleventh distinctly compressed, setae rather short. Tempora quite strongly convex and very coarsely punctate.

Pronotum (Pl. I, fig. 20.) about a fifth wider than long; apex about equal to the base, arcuately lobed in middle three-fifths and rather deeply sinuate laterally within the angles, which are obtuse and scarcely more prominent than the margin at middle; sides moderately broadly arcuate, straight posteriorly, margin more or less noticeably irregular, feebly sinuate at about middle fifth, rather broadly but not deeply sinuate in basal fourth, margin quite parallel before the angles, the latter obtusely rectangular; base broadly arcuate, sinuate before the scutellum and rather broadly so laterally within the angles; disk moderately convex, broadly impressed laterally, margin noticeably explanate and feebly reflexed, bicarinate, carinae arcuately continuous at the apical border in about middle third, parallel and strongest anteriorly, becoming less so behind the middle, each carina ending at the lateral limit of the prescutellar sinuation of the base; strongly, coarsely and densely punctate, punctures smaller on the carinae anteriorly; explanate lateral margins subasperate.

Propleurae rather coarsely punctate and more or less longitudinally rugose, punctures well exposed, submarginal area narrowly subasperate. Prosternum feebly arcuate between the coxae and somewhat mucronate at apex of the process; densely, coarsely punctate, punctures somewhat coalescent laterally and slightly asperate.

Elytra about one and a half times as long as wide, base irregularly but not strongly margined; sides broadly and moderately arcuate, widest at or slightly behind the middle, noticeably wider than the prothorax, narrowing slightly toward base, apex rather broadly rounded; humeri subdentiform, due to the vertical compression of the basal epipleural margin, pronotal base slightly overlapping the base, the angles received within the humeri; disk moderately convex, arcuately declivous and inflexed laterally, moderately and arcuately declivous apically, first two or three costae slightly raised above the surface, thence they gradually become more prominent laterally (Pl. I, fig. 7.), carinae narrow and linear, carinal punctures punctiform and very widely spaced, paracarinal punctures small and located against the carinal margins, separated by a distance equal to two or three times their diameter, few vestigial parastrial punctures are seen here and there; striae of moderate sized punctures, which are slightly and individually impressed, not sharply defined and with the anterior and posterior margins slightly impressed, as observed under oblique illumination; costae two, four and six moderately abbreviated before the base, the sutural attaining the apex and there briefly atrophic, others distinctly shortened, before the narrowly impressed and more or less subhorizontal and submarginal surface. Epipleurae smooth, with a row of punctures similar to those of the strial series, which become briefly duplicated at base, and an irregular series of smaller paramarginal punctures along the superior margin. Parapleurae very coarsely and closely punctate. Metasternal epimera with two to four large punctures (Pl. V, fig. 15.). Meso- and metasternum similar in sculpturing to that of the prosternum Abdomen more or less shining, punctures moderately coarse, denser and coarser as well as slightly rugose laterally on the first segment; centrally the punctures are somewhat smaller and more discrete, separated by a distance equal to two or three times their diameter, punctures smallest on the fourth segment and a little larger on the fifth. Legs moderate in stoutness and length (Pl. III, figs. 3A, 3B and 3C.).

The general facies is the same in the sexes. The males may be slightly narrower at times, the middle lobe of the mentum is modified to form a prominent truncated tubercle and the abdomen is rather more strongly impressed on the middle of the first and second segments. In the female the mentum is simply carinate and the abdomen rather less strongly impressed along the middle.

Measurements: Length, 7.5 to 8.5 mm.; width, 2.4 to 3.2 mm.

*Types* deposited in the Eschscholtz collection: "Sammlg. via Welt an Mus. Zurich. Moskau, ausbeute seiner I. Welt-Reise ex parte an Mus. Dorpat."[7]

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[7] Suppl. Ent., Nr. 12, p. 43, (1926).

*Distribution.*—CALIFORNIA: Marin County.—Tiburon, January 28, 1922; Dipsea, June 8, 1914, in association with a small species of ant in a ledge of loose rocks, (Blaisdell). Lake County.—May, 1895, (Van Dyke; Coll. Chas. Liebeck). Tehama County.—Western, May, 1895, (Van Dyke); Corning, October, 1892, (Blaisdell). Shasta County.—(Nunenmacher). Butte County. —Near Chico, in Butte Creek Canyon, April 25, 1922, (H. E. Richards). Sacramento, January 3, 1927, (Coll. U. S. Nat. Mus.). Calaveras County.— Near Mokelumne Hill, along the Calaveras River below Lombardi's ranch, May, (Blaisdell). Mariposa County.—Yosemite Valley, June 3, 1921, (Van Dyke); June 7, 1930, and at Wawona, June 12, 1930, (Blaisdell). Humboldt County. —Bair's Ranch, Redwood Creek, (Coll. H. S. Barber, U. S. Nat. Mus.). Madera County.—Chiquito Creek, April 11, 1920, alt. 4100 ft., and at Norfork, March 14, 1920, (Henry Dietrich). Fresno County.—South Fork King's River Canyon, July 6, 1910, alt. 5000 ft , (Van Dyke); Dalton Creek, April 25, 1920, alt. 4800 ft., (Dietrich). Tulare County.—Kaweah, (Coll. Chas. Liebeck); Potwisha, Sequoia National Park, June 2, 1929, alt. 7000–9000 ft., (Van Dyke).

*Bicarinata* is a very distinct and easily recognized species; the distinctly bicarinate pronotum, costate elytra and tuberculate mentum in the male, give a very characteristic facies. Mr. Dietrich found it in company with a large ant—*Camponotus vicinus* Mayr. Specimens collected by Mr. F. W. Nunenmacher in Tehama County were associated with a species of *Messor*, which has the epinotal spines much shorter than in *Messor andrei* Mayr, at least such is the case in the ant accompanying the specimen.

*Genital Characters.*—Male. (Pl. VI, figs. 3A, 3B and 3C.). The edeagophore is elongate, about three and a half times as long as the width of the basale, moderately arched and of the usual depressed flax-seed-shape. The apicale is not strongly depressed, triangular and the dorsal surface is moderately convex, median groove feeble and more or less entire, apex obtuse and very feebly emarginate; sides broadly, evenly and moderately arcuate, base noticeably arcuate; ventral surface moderately convex opposite to and just basad to the subangulate genital fissure, slightly concave beneath the apex; the inflexed sides or alae of the dorsal plate rather broad and somewhat rapidly narrowed to acute points in juxta-position at the suture between the inflexed sides of the basale. The genital fissure shows the rather narrow and subcylindrical intromittent organ *in situ.* The basale is moderately arcuate, most so in basal half, sides parallel and feebly arcuate; inflexed sides beneath are rather wide and the membranous interval narrower.

Female. The genital segment (Pl. VI, figs. 1 and 2.) is triangular in outline, dorsal surface more or less plane or convex according to the dryness or freshness of the specimen, well chitinized; lateral borders of the valves not margined, but rounded and somewhat flattened on the edge, apex obtusely rounded when in adduction. Each dorsal plate or sclerite is moderately narrowed apically, with inner margin quite straight, surface smooth; appendages short and cylindrical, each with two or three long tactile hairs at tip. Each appendage arises from a fossa in a subfusiform sclerite or stylifer which has raised line-like margins; this sclerite arches inward at tip to form the apex of the valve. The ventro-lateral surface is rather evenly convex; that of each valve is divided by two sutures into three sclerites which are closely united along the sutures; the distal suture is arcuate. The apex of the apical sclerite forms the small true apex within and beneath the apex of the stylifer. Surface of the valves very sparsely punctulate, each punctule giving origin to a short and more or less erect hair. The salient genital characters are given in synoptic form.

### APSENA LeConte

1862. *Apsena* LeConte, Smiths. Misc. Coll., III, p. 228. (Class. Col. Am. N. Mex., Pt. I.)

Middle lobe of the mentum well developed and carinate in both sexes, lateral lobes small and not well exposed. Third antennal joint more or less elongate. Elytra 9-costate, and margined at base, conspicuously pubescent in part of the species; epipleurae rounded or obtusely angulate at base, where the margin is never as prominent anteriorly nor excavated as deeply as in *Eulabis* Esch. Antennae more or less robust, outer joints always more or less decidedly transverse.

GENOTYPE: *Apsena pubescens* LeConte.

It can be seen by the treatment given below to the species of *Apsena*, that it has been necessary to describe four new species and three new varieties. A close study of moderately large series of specimens revealed marked differences or variation between groups that have heretofore been considered identical and homomorphic; these variants are at the present time defined as new species or as varieties. One very distinct new species is described as *leachi*. The species of *Apsena* fall naturally into two very well defined groups which may now be tabulated as follows:

Pronotal lateral margins flush with the plane of the propleural surface (Pl. V, fig. 16.)..................*Pubescens* Group
Pronotal lateral margins explanately prominent, projecting beyond the plane of the propleural surface (Pl. V, fig. 17.). *Rufipes* Group

The correlated genital characters are likewise sharply indicated and readily recognizable.

Genital valves of the female without a distinct stylifer; dorsal plates or sclerites explanately produced at apex (Pl. VI, figs. 4 and 5.)................................*Pubescens* Group

Genital valves of the female with distinct stylifer, which forms the apex of the valves, the dorsal plate not in the least explanate at the apex (Pl. III, figs. 4 and 5.).............*Rufipes* Group

*Synopsis of the Pubescens Group*

Elytra distinctly costate, costae more or less entire; legs more or less rufous.......... ...................... .. .....1

Elytral costae more or less atrophic and interrupted; carinal punctures rather prominent and finely submuricate at summit of the costal segments; surface irregularly and distinctly punctate, due to a parastrial series; punctures minutely setigerous throughout; elytra more or less inflated, luster opaque, legs black. Largest and insular species.
*grossa* LeConte

1. Paracarinal punctures against the carinal margins; sutural costae always present; tibiae and tarsi more or less rufo-piceous to nigro-piceous.... .... .... ........... ...2

   Paracarinal punctures noticeably distant from the carinal margins; sutural costae absent; elytra conspicuously pubescent; legs rufous and unicolorous.. ........... ..... ...3

2. Elytra distinctly pubescent, hairs long, coarse and erect; costae sharper at summit—subogival in transverse section; luster very opaque.................. *leachi* new species

   Elytra not pubescent, punctures minutely piliferous, hairs slightly longer on the declivous surfaces—about 1 mm. in length; femora bright rufous.............*laticornis* Casey

   Pubescence somewhat conspicuous on the elytra, about 1 mm. in length on dorsum, 2.5 mm. on the declivous surfaces.
   *subvestita* new variety

3. Form different in the sexes; males narrower and more elongate; elytral pubescence of unequal length............... ...4

   Form more robust, not different in the sexes; elytral pubescence of equal length, shorter; color rufo-piceous to nigro-piceous, elytra black. Southern California....*barbarae* new species

4. Color nigro-piceous; head, pronotum, antennae and under surface of the body more or less dark rufous......... ...5

   Color bright rufous throughout, elytra alone nigro-piceous; propleurae lunato-rugose, lunules smaller and shorter, especially anteriorly, posteriorly and in the submarginal area. Ensenada, Lower California......*rufescens* new subspecies

5. Propleurae lunato-rugose, punctures small and obscured; lunate tubercles of the submarginal area larger and more shining .............................. *pubescens* LeConte

 Propleurae as in *pubescens*, except that the submarginal area is densely lunato-rugose, lunulate tubercles shorter and discrete. Color piceous, less rufous than in *pubescens*. Todas Santos, Lower California and San Martin Island. *insularis* new species

The student will note that the Pubescens Group is divisible into three Sections: 1. *Grossa* Lec. stands alone in its facies, black color and sculpturing. 2. *Leachi*, *laticornis* and its variety, have the paracarinal punctures against the carinal margins and the sutural costae of the elytra are always present. 3. *Pubescens* and its subspecies have the paracarinal punctures distant from the carinal margins and the sutural costae of the elytra are absent except a remnant lateral to the scutellum. These remarks call attention to the relationships—how do they correlate with the genital characters?

*Female Genital Characters of the Pubescens Group*

Dorsal plate or sclerite of each valve more or less narrowed from base to apex... ................. ..................1

Dorsal plate parallel and of equal width throughout, apex moderately explanate, as wide as the plate and quite semicircularly rounded at tip; appendages mammilliform and not elongate.. .... ..... ...........*grossa* LeConte

1. Apex of the dorsal plate markedly produced, narrowed apically, slightly recurved and everted, concave beneath; surface of the lateral border rather narrowly flattened from the base of apex to middle of the valve. Appendages cylindrical, slender and elongate..................*pubescens* LeConte

 Apex more broadly obtuse at tip, less narrowed and rather less produced; appendages less elongate and somewhat obconical. *insularis* new species

 Apex of the dorsal plate less strongly produced and not narrowed apically.................................2

2. Explanate apex of the dorsal plate not involving the entire apex, narrower with sides parallel, the inner border continued as a fine carinulate line basad upon the dorsal and ventral surface for a short distance; appendages stouter and cylindrical..............................*laticornis* Casey

Explanate apex involving the entire width of plate, rather short and broad, somewhat everted, concave beneath; when viewed from beneath appears somewhat emarginate with the inner margin of the apical sclerite. Dorsal plate rather rapidly narrowed apically and distinctly, broadly sinuate at the appendage, the latter is stout, somewhat elongate and mammilliform; lateral surface basad to the fossa somewhat membranous, punctate and setigerous. . . . *leachi* new species

The salient female genital characters likewise permit of the division of the species of the Pubescens Group into three Sections: 1. *Grossa* Lec. stands alone in the parallel form and broadly rounded apex of the dorsal plate of the valve. 2. *Leachi*, *laticornis* and its variety, have the dorsal plate distinctly narrowed from base to apex, tip not strongly produced and broadly rounded. 3. *Pubescens* and its subspecies have the dorsal plate, also narrowed apically, with the tip strongly produced and narrowed at tip. These remarks simply call attention to the main differences which are further elucidated in the above synopsis, are based on facts and not theory. Male characters cannot be epitomized to indicate relationship of specific groups and are probably only of value in indicating subfamily relationships.

**Apsena pubescens** (LeConte)

1851. *Eulabis pubescens* LeConte, Ann. Lyc. N. Y., v, p. 144, Sept. (New Species Calif. Col.).

1859. *Eulabis pubescens* Lacordaire, Hist Nat. d. Ins., Gen. des Col., v, p 133.

1861. *Apsena pubescens* LeConte, Smiths. Misc. Coll., p. 228, May. (Class. Col Am. N. Mex., Pt. I) [Genotype.]

1870. *Eulabis pubescens* Horn, Am. Philos. Soc., XIV, p 324. (Apsena.) (Revis. Tenebr.).

1891. *Eulabis pubescens* Casey, Ann. N. Y. Acad. Sci., v, p. 59, Nov. (Col. Not., III.)

Form oblong, elongate, subparallel and somewhat depressed, slightly more than twice as long as wide. Color more or less dark rufous, under surface of body rufo-piceous, sometimes paler from immaturity; elytra piceous to black; legs, antennae and head occasionally tinged with piceous. Pubescence yellowish on the elytra, more or less rufous elsewhere; long and conspicuous on the sides of the elytra and apical declivity, the hairs varying in length, the longest subequal to the length of the third antennal joint, frequently broken and stubby, shortest on the disk; shorter, stouter and semi-erect on the head and pronotum; a little less stout and recumbent on the meso- and metasternum, long and flying on the prosternum, while those of the propleurae are more or less appressed to the surface.

Head noticeably wider than long, widest across the anterior canthi, which are a little more prominent than the eyes; sides almost straight, feebly arcuate and moderately convergent to the quite broadly rounded epistomal angles, not notched at the oblique sutures, very moderately reflexed; epistoma truncate at apex, frontal sutures obliterated; frons almost flat, broadly and feebly impressed along the epistomal base, punctures small and raised on small discrete tuberculiform elevations, smaller on the vertex and reflexed sides, quite evenly distributed, separated by a distance equal to two to four times their diameter, each setigerous. Mentum differing somewhat in the sexes. Ligula transverse, broadly and rather feebly emarginate at apex. Antennae (Pl. II, fig. 4.) rather short, not attaining the pronotal base, stout, gradually incrassate, outer six joints distinctly compressed; second joint as long as wide, rather small, third not very elongate, about a fourth longer than wide and two-thirds longer than the second, fourth to the tenth inclusive subequal in length, fourth to the sixth inclusive as long as wide, seventh nearly twice as wide as long, eighth to tenth inclusive strongly transverse, gradually increasing in width and more than twice as wide as long, eleventh not quite as wide as the tenth, noticeably transversely oval, asymmetrical and arcuate at apex.

Pronotum (Pl. I, fig. 21.) about a third wider than long, widest at middle; apex arcuato-truncate, angles not prominent anteriorly and moderately rounded; sides broadly, evenly and moderately arcuate, slightly convergent and feebly less arcuate toward base, very briefly sinuate at the angle due to the basal bead forming a short right angle; base broadly and feebly arcuate, quite equal in width to the apex; disk evenly and less than moderately convex, not impressed laterally, slightly so within the basal angles at margin, densely and coarsely punctate, the intervals narrowly convex, reticulately anastomosing and enclosing the more or less longitudinally coalescent punctures, less so in the central area, each with a moderately stout and semierect seta; lateral bead moderately fine and slightly reflexed.

Propleurae longitudinally and moderately strongly rugose, lunato-rugose in the submarginal area below the pronotal bead; punctures small, obscured on the upper surface of the rugae; surface moderately convex and flush with the pronotal margin (Pl. V, fig. 16.). Prosternum moderately coarsely and subasperately punctate, punctures not sharply defined.

Elytra oblong-oval, a little more than twice as long as wide; base transverse, slightly wider than the pronotal base; sides parallel, broadly and slightly arcuate, moderately broadly rounded at apex, humeri obtusely rounded and exposed; disk moderately flattened and feebly convex, strongly and arcuately deflexed laterally, arcuately declivous apically; first sutural costae obsolete (Pl. I, fig. 4.), sometimes the second as well but evident at the sides of the scutellar area, thence the costae gradually become more prominent, carinae rather strong but scarcely irregular at the sides, carinal punctules widely spaced, paracarinal punctures small, about their own width or more distant from the carinal margins, separated from each other by a distance equal to four or five times their diameter, piliferous, giving origin to the visible pubescence; strial punctures moderate in size, rather shallow and about three times the size of the paracarinal punctures.

Epipleurae not or feebly margined at base beneath the humeri, sparsely punctate, punctures slightly muricate and quite equal in size. Parapleurae coarsely punctate, punctures round and shallow, moderately strongly defined, somewhat coalescent on the mesopleurae. Punctures of the meso- and metasternum not so well defined, shallow and somewhat scabrous. Metasternal epimera with three or four large punctures (Pl. V, fig. 13.).

Abdominal surface shining, more or less impressed along the middle in both sexes; moderately coarsely punctate, punctures discrete and separated by a distance equal to one or two times their diameter; laterally on the first three segments the punctures are somewhat larger and the surface slightly rugose. Each puncture gives origin to a rather long and semirecumbent seta.

Legs (Pl. IV, figs. 2A, 2B and 2C.) moderate in length and rather stout. The meso- and metafemora gradually increase in size toward the apex, the profemora are considerably inflated in apical two-thirds; the pro- and mesotibiae are feebly arcuate; tarsi moderately robust.

Males are usually more parallel and therefore more elongate than the females, more strongly impressed on the middle of the third abdominal segment. The mentum (Pl. IV, fig. 13.) has the carina more prominent and thicker apically; surface more scabrous and the impressions more strongly foveate. In the female the mentum (Pl. IV, fig. 14.) is punctato-scabrous, middle lobe not prominent ventrally and obtusely rounded at apex, lateral lobes small; carina less broad and only slightly prominent, lateral impressions broad but not strong.

Measurements: Length, 7 to 9.2 mm.; width, 2.5 to 3.5 mm.

*Type.*—In the LeConte collection, Entomological Department of Harvard University, Cambridge, Massachusetts.

*Type Locality.*—San Diego, California.

*Distribution.*—CALIFORNIA: San Diego, April 26, 1891, (O. N. Sanford, G. W. Dunn and F. E. Blaisdell; Coll. Chas. Liebeck); January 24, 1924, (Warwick Benedict); Jacumba, San Diego County, January 1, 1929. Agua Caliente, Lower California, December 29, 1928, (E. C. Van Dyke). Colton, Riverside County, January 10, 1910, (E. C. Van Dyke; Coll. Chas. Liebeck). Santa Barbara, November 20, 1928, (F. E. Blaisdell). Los Angeles, (E. C. Van Dyke; Coll. Chas. Liebeck). Santa Catalina Island, (Thos. L. Casey; H. C. Fall).

*Pubescens* is easily recognized by the elytral pubescence, the hairs on the sides and apical declivity are very unequal in length; it frequently happens that the hairs are more or less broken off and stumpy. In *barbarae* described below, the elytral hairs are shorter and of equal length and finely pointed at tip when entire, they are also frequently worn and stumpy, but it rarely happens that all of the long hairs of *pubescens* are broken off. In *barbarae* the body form of the sexes is the same. In *pubescens* the male is narrower and appears more elongate than the female; these characters are very evident in a large series of the typical phase taken at San Diego. The smaller specimens of *pubescens* show less difference in the form of the sexes; in the drier regions where the species occur these dwarfed forms are more common, such are those studied from Santa Catalina Island. The distribution of *barbarae* will be discussed under that species.

*Genital Characters.*—Male (Pl. VI, figs. 6A, 6B and 6C.). Edeagophore elongate and of the usual flax-seed-shaped appearance. Apicale triangular, rather more than a half longer than wide, sides moderately arcuate becoming broadly and very feebly sinuate in apical half; dorsal surface moderately convex, and broadly flattened in the central area, dorsal groove distinct in apical half, apex obtusely rounded and narrow, slightly emarginate; base angulate at middle and sinuate laterally. Ventral surface rather strongly prominent and convex across the middle just basad to the genital fissure; the inflexed sides or alae of the dorsal plate rather broad, gradually and rather acutely narrowed between the inflexed sides of the basale; apical area rather strongly impressed at sides of the genital fissure and apicad thereto, median suture distinct. Genital fissure ovate and occupied by the rather broad intromittent organ. Basale moderately depressed, scarcely wider than the base of the apicale, very strongly arcuate in basal half; apex angulately emarginate and adapted to base of the apicale; the inflexed sides beneath are moderate in width, membranous interval moderately wide.

Female. Dorsal surface (Pl. VI, fig. 4.): Genital segment triangular when the valves are in full adduction. Each dorsal plate or sclerite elongate and distinctly narrowed apically, inner margin nearly straight and rounding with the broadly arcuate base; lateral border rather narrowly rounding into the ventro-lateral surface, distinctly impressed, the impressed area elongately fusiform, extending from just apicad to the appendage to basal third, this area appears to be semimembranous, sparsely punctate, each puncture with a short erect hair; dorsal surface obliquely impressed, apex strongly produced and narrowed to the subacute tip, slightly convex above and concave beneath, more or less feebly recurved and everted, quite characteristic of the species. Appendage long and cylindrical, about three and a half times as long as wide, with two or three long tactile hairs at apex. Ventral surface (Pl. VI, fig. 5.) moderately convex, each ventro-lateral plate divided by two transverse sutures into three sclerites; inner margins irregular and emarginate at the basal suture, the three sclerites not distinctly connate. Apical sclerite forms the true apex beneath the produced apex of the dorsal plate, is semimembranous, and with the middle sclerite sparsely punctate, each puncture with a short hair. Pudendal membrane longitudinally rugulose as usual.

**Apsena pubescens** s. sp. **rufescens,** new subspecies

Form oblong-oval as in *pubescens* Lec., about two and two-thirds times as long as wide. Color bright rufous to testaceo-rufous, the elytra alone nigro-piceous. Luster opaque. Pubescence as in *pubescens,* tawny in color over the greater part of the body; paler, finer and shorter in the central area of the elytral disk than at the sides and apex.

Head rather transverse, sides before the eyes nearly straight and moderately convergent, slightly reflexed, sometimes feebly emarginate at the oblique sutures; epistomal apex truncate, angles rather broadly rounded, surface slightly convex; frons feebly convex, broadly but not strongly impressed on the frontal suture, rather densely punctate, punctures not deep, moderately coarse rendering the surface subasperate; punctures smaller on the epistoma, less dense and submuricate; each puncture with a short, stiff and erect seta. Superior extremity of the eyes rather small, posterior canthi rather densely setigerous, the setae anteriorly directed, even over the eyes, the latter narrowly reniform. Mentum subasperately sculptured; middle lobe quite horizontal, rather broadly rounded at apex, lateral lobes small; carina not attaining apex, flattened, rather broad and thickened in apical third, narrowing and acute in basal two-thirds; surface feebly impressed lateral to the carina. Antennae as in *pubescens,* not quite attaining the pronotal base.

Pronotum about a half wider than long, usually almost as wide as the elytra at middle; sides evenly, moderately strongly arcuate from apex to near the base, where they become briefly straighter to scarcely sinuate, marginal bead thin and very narrowly reflexed; apex quite transverse, angles well rounded; base very feebly and broadly arcuate, coarsely beaded, angles obtusangular; disk evenly convex, not noticeably impressed along the lateral margin, densely rugoso-punctate, punctures more or less coalescent in longitudinal lines, each with a moderately long, curved and semierect seta.

Propleurae longitudinally rugose, punctures small, not exposed, being located on the upper surface of the rugae; in the submarginal area the rugae are fragmented, forming shining lunate tubercles for each puncture at their lower borders; each puncture has a moderately long seta that is almost appressed against the surface. Surface flush with the pronotal margin. Prosternum not strongly scabro-punctate; process arcuate between and behind the coxae.

Elytra about a half longer than wide, usually a little wider than the pronotum and oblong-oval; sides parallel, not more than moderately arcuate, apex rather broadly and obtusely rounded; base truncate, humeri rounded and obtuse; disk moderately feebly convex throughout the central area, strongly and arcuately deflexed laterally and apically; surface quite smooth and punctured as in *pubescens*, not in the least muricate laterally or apically, sutural costae obsolete as usual in the *pubescens* group; carinal punctules minute but distinct under sufficient power, paracarinal punctures at least their diameter distant from the carinae, each with an erect hair, the latter are shorter in the central area of the disk, longer, irregular in length laterally and apically.

Epipleurae irregularly and sparsely punctate, basal margin obtusely angulate beneath the humeri. Meso- and metasternum scabro-punctate, punctures moderately sharply defined. Parapleurae densely punctate, punctures large and round, only moderately well defined and somewhat scabrous anteriorly. Metasternal epimera moderate in size, with four or five smaller but coarse punctures.

Abdomen evenly, rather coarsely and densely punctate, punctures well defined, a little smaller on the fifth segment; surface more or less shining; segments one, two and three more or less broadly impressed along middle third.

Legs of moderate length and stoutness as in *pubescens;* outer margin of the protibiae distinctly denticulate.

Measurements: (Type) Length, 8 mm.; width, 3 mm.

*Holotype.*—Male, No. 3006, in the collection of the California Academy of Sciences. Collected by J. R. Slevin, at Ensenada, Lower California, on April 7, 1921. In the type the right protarsus and hind leg are missing.

*Paratypes:* Two males were taken at the same time and place as the type and are located in the Academy's collection. Females unknown.

*Rufescens* is sufficiently different in facies and details to warrant the grade of subspecies. The bright rufous color and dark elytra are characteristic and the mentum is not strongly sculptured. *Pubescens* at times have the head, pronotum and under surface of the body more or less distinctly rufous, but the color is never as marked as in *rufescens* and may be due to more or less immaturity. In *pubescens* the under surface of the body is usually a dark rufo-piceous. Specimens kept for considerable time in alcohol fade when dried and the color is rufous to a varying degree.

*Genital Characters.*—Male. The apicale of the edeagophore is of the usual triangular form, well depressed, feebly but distinctly emarginate at tip; the dorsal impressed median line is well defined apically; ventral surface of tip slightly excavated apicad to the genital fissure; intromittent organ narrow and cylindrical within the fissure.

### **Apsena insularis** new species

Form oblong-oval, slightly more than twice as long as wide and rather more elongate than in *barbarae*. Color dark rufo- to nigro-piceous, elytra black, legs rufous. Luster opaque. Pubescence as in *pubescens*, conspicuous and golden brown in the living state; hairs of the central area of the elytra short, much longer and irregular in length at the sides and on the apical declivity, erect, longest hairs not exceeding the length of the second antennal joint; long and flying on the prosternum. The setae of the frons and pronotum more or less semierect, while those of the propleurae, canthi, sterna, abdomen and legs are more or less appressed to the surface; the setae are rufous in color on the legs.

Head as wide as long, widest across the anterior canthi; sides moderately anteriorly convergent before the eyes, slightly arcuate, feebly reflexed, slightly notched at the oblique sutures; epistomal apex feebly truncato-emarginate, angles rather broadly rounded; frons feebly convex, broadly and slightly impressed along the frontal suture, the latter more or less obliterated, quite densely punctate, punctures coarse and somewhat coalescent on the vertex, smaller and less crowded on the epistoma and adjacent frons. Eyes very narrow (Pl. I, fig. 14.). Mentum of the male has the middle lobe rather prominent ventrally and coarsely punctato-scabrous, not strongly rounded at apex;

carina broad apically and narrowed to base, lateral impressions rather strong in basal half; lateral lobes small. In the female the middle lobe is more horizontal, carina flatter. Antennae (Pl. II, fig. 7.) moderately robust, not attaining the pronotal base, very gradually and less than moderately incrassate; second joint about as long as wide, third elongate and twice as long as the second, fourth as long as wide and a little longer than the sixth, the latter to the tenth inclusive quite equal in length, fifth to the tenth very gradually increasing in width, eighth, ninth and tenth most transverse, each about two-fifths wider than long, eleventh as wide as the tenth and slightly obliquely oval. All the joints are of equal width when viewed edgewise. Tempora setigerous.

Pronotum about a fifth wider than long, apex slightly arcuate, scarcely sinuate opposite to the eyes; sides broadly and evenly arcuate, becoming straighter and briefly parallel or feebly sinuate before the basal angles, the latter obtusangular or rectangular; base broadly and feebly arcuate; disk slightly convex, not at all impressed along the lateral marginal bead, the latter moderately strong and feebly reflexed, densely, coarsely rugoso-punctate, punctures markedly longitudinally coalescent, each with a short, curved and semierect seta.

Propleurae longitudinally rugose, rugae more or less fragmented toward the pronotal margin, the fragments forming shining lunate tubercles, each supporting a small puncture on its upper surface, each with a moderately long and appressed seta, surface flush with the pronotal margin. Prosternum rather coarsely punctato-rugose, punctures of the central area with long hairs.

Elytra about two-fifths longer than wide, sides parallel, broadly and less than moderately arcuate, at middle a little wider than the pronotum, apex broadly rounded; disk broadly flattened and very moderately convex, strongly and arcuately deflexed laterally and apically; sutural costae obsolete (Pl. I, fig. 2.), second and third feebly elevated, thence to the ninth more strongly prominent, all more or less atrophic before the apex; carinae quite narrow and even in width, punctules small and very widely spaced as usual; paracarinal punctures at least their own diameter distant from the carinae and from each other by a distance equal to two, three or four times their own diameter, each giving rise to a more or less long hair; strial punctures moderately large, round, slightly impressed on their posterior margins as seen under oblique illumination, separated by a distance equal to three times their own diameter; costae two, four and six moderately abbreviated at base.

Epipleurae irregularly and sparsely punctate, lower margin of each puncture subtuberculate and shining; base more or less obtusely rounded beneath the humeri. Parapleural punctures large, round, rather shallow and in part distinctly defined. Those of the mesosternal episterna more or less coalescent, while those of the metasternal episterna are quite discrete. Metasternal epimera with three or four large round punctures. The meso- and metasternal punctures are less coarse and the surface is more or less punctato-rugose.

Abdomen less than moderately convex, slightly flattened along the middle third of the first three segments in both sexes; surface coarsely punctate, punctures of the central area more widely spaced, while those laterally are larger and the surface more or less rugose; punctures of the fifth segment are smaller. Each abdominal puncture bears a moderately long and suberect hair.

Legs moderate in stoutness and length; profemora moderately inflated and robust, the meso- and metafemora not inflated and gradually increased in thickness toward apex. The metatarsi (Pl. III, fig. 10.) are rather robust; second and third joints equal in length, each as wide as long; first as long as the combined length of the second and third; the fourth a little longer than the first.

Secondary sexual characters are not well marked: Males may be a little narrower and rather more elongate than the females, and a little more strongly impressed on the second abdominal segment.

Measurements: (Types) Length, 8 to 8.5 mm.; width, 3 to 3 4 mm.

*Holotype.*—Female, No. 3007, and allotype, No. 3008, in the collection of the California Academy of Sciences. Collected by H. H. Kiefer, on San Martin Island, off the coast of Lower California, June 8, 1925.

*Paratypes:* Eleven specimens in the Academy's collection. Five were taken at the same time and place as the types. Six others were secured at Todos Santos, Lower California, by J. R. Slevin, on May 27, 1923.

*Insularis* is considered as a distinct species for the following reasons: By its insular habitat, darker nigro-piceous color and genital characters, besides the more opaque luster and subasperate upper surface.

*Genital Characters.*—Male. Edeagophore (Pl. VI, figs. 9A, 9B and 9C.) is of the usual form, elongately flax-seed-shaped. The apicale is slightly elongate apically, dorsal surface plane, median impressed linear groove in apical half and rather strong at apex, the latter feebly emarginate. Ventral surface (Pl. VI, fig. 9B.) is moderately convex, most so at middle just basad to the genital fissure, the latter occupied by the intromittent organ; the basale is rather strongly depressed, in form semicylindrical and moderately strongly arcuate.

Female. Genital segment (Pl. VI, fig. 7.) triangular, moderately plane above and convex beneath. Valves well chitinized and not margined laterally. The dorsal plates are narrowed apically, about three times as long as wide; each has the surface more or less broadly impressed and with a few widely scattered piliferous punctules, the apices are moderately produced and a little everted, flattened, feebly convex above and correspondingly concave beneath, with the apices broadly and evenly rounded. The lateral margin of each valve is somewhat flattened at and basad to the appendage to about middle of the sclerite and somewhat less chitinized. This area is not sharply defined nor margined to constitute a styliferous sclerite. Appendage about twice as long as wide, cylindrical and more or less slightly narrowed at base. Ventral surface (Pl. VI, fig. 8.) of each valve strongly convex, divided by two transverse sutures into three sclerites which are not completely connate; the basal sclerite is widest and somewhat obliquely directed inward and slightly basad; the middle sclerite is about as wide at base as the length of its inner margin, its apex is obliquely cut by the apical suture, while the apical sclerite is subtriangular and forms the true apex beneath the explanate apex of the dorsal plate. Each sclerite has a few scattered piliferous punctules. The inner ventral margin of each valve is irregular from differences in form of the sclerites, being broadly emarginate at the basal suture.

The differential genital characters referred to above are the following: The shorter and broader apices of the dorsal plates, less elongate appendages which appear slightly clavate. In *pubescens* the apices of the dorsal plates of the valves are much more elongate and narrowed apically; the appendages are markedly elongate and cylindrical, being three times as long as wide.

**Apsena barbarae** new species

Form oblong-oval, less elongate and more robust than in *pubescens* Lec., similar in the sexes, a little less than one and a half times longer than wide. Color nigro-piceous; under surface of body more or less dark rufo-piceous, legs rufous. Luster dull to opaque. Pubescence of the elytra shorter than in *pubescens*, less conspicuous and somewhat darker in color, that of the deflexed sides and apical declivity of equal length in the types and paratypes, shorter on the central area of the disk; elsewhere as in *pubescens*.

Head rather small, wider than long, not as wide as the pronotal apex; sides of the front before the eyes nearly straight, moderately convergent and slightly arcuate; epistomal apex feebly arcuato-truncate, angles very broadly rounded; frons somewhat convex, feebly and broadly impressed along the frontal suture and within the sides, quite densely punctate, punctures small, slightly raised on small subtuberculiform eminences, surface more or less finely granulato-rugulose. Mentum of the usual form, slightly different in the sexes; carina broader apically, becoming narrower and subacute toward base, rather coarsely punctate; surface rather strongly impressed each side of the carina, the foveae somewhat smooth. Antennae moderately robust, distinctly incrassate, third joint a little longer than the fourth, joints four and five quite equal in length, eighth, ninth and tenth transverse, eleventh as long as wide and not wider than the tenth. Eyes narrowly reniform.

Pronotum about a half wider than long, apex feebly arcuato-truncate, angles rounded; sides strongly and evenly arcuate, straighter toward base and feebly, briefly sinuate before the angles which are obtusangular, base transverse and feebly arcuate, bead rather wide and obliquely flattened; disk evenly convex from lateral bead to bead, not impressed within the submarginal area, very densely punctate, punctures more or less coalescing in longer and shorter series, the intervals linearly convex, reticulately anastomosing to enclose the series and discrete punctures; each puncture gives origin to a moderately long and semierect seta.

Propleurae longitudinally rugose, punctures small and obscured, being situated on the upper surface of the rugae; in the submarginal area the rugae become fragmented, forming shining lunate tubercles on the lower border of the punctures; each puncture has a rather long seta which is more or less appressed to the surface. Propleural surface flush with the pronotal margin. Prosternum subasperately punctate, slightly rugose laterally; punctures not well defined, each with a long flying hair.

Elytra oblong-oval, a little more than a half longer than wide, humeri obtusely rounded; sides parallel, broadly and very moderately arcuate, apex broadly rounded; disk moderately convex, less so in the central area, strongly and arcuately deflexed laterally and apically, the apical declivity slightly oblique; first or sutural costae obsolete, second more or less so, paracarinal punctures distant from the carinal margins and nearly half as large as the strial punctures in size, each giving origin to an erect hair.

Epipleurae sparsely and rather coarsely punctate, punctures slightly muricate toward the base, basal margin obtusely margined beneath the humeri. Parapleurae very coarsely punctate, punctures round and shallow with some coalescence; punctures of the meso- and metasternum similarly coarse, more irregular and the surface more or less subrugose to subasperate.

Abdomen coarsely, irregularly punctate, punctures separated by a distance equal to almost twice their diameter, smaller on the fifth segment; surface impressed along the middle third of first three segments in both sexes.

Legs moderate in length and stoutness as in *pubescens* Lec.

Secondary sexual characters not well defined. In the male the second abdominal segment is a little more strongly impressed at middle; the middle lobe of mentum is a little more prominent ventrally and the carina thicker apically than in the female.

Measurements: (Type), Length, 8 mm.; width, 3.5 mm.

*Holotype.*—Female, No. 3009, in the author's collection, Museum of the California Academy of Sciences. Collected at Santa Barbara, California, by the author, June 22 and 25, 1931.

Twenty-two specimens studied. *Paratypes* in the author's collection. One has also been placed in each of the following collections: United States National Museum, Washington, D. C.; American Entomological Society of Philadelphia; Warwick Benedict in the Museum of the University of Kansas; Chas. Liebeck of Philadelphia, Pa.

*Distribution.*—CALIFORNIA: Santa Barbara, November 20, 1928; January 21, 1930, and June 22-25, 1931, (Blaisdell); December 22, 1928, (Van Dyke). Point Conception, Santa Barbara County, (Benedict); Santa Inez, Santa Barbara County, July, 1915, (Van Dyke). Los Angeles County—Los Angeles, (Van Dyke); Santa Monica, April 5, 1924, (Benedict); Pasadena, January 9, 1917, and March 20, 1928, (Martin). Avalon, Santa Catalina Island, October 28 and 31, 1908, [U. S. Nat. Mus. Coll.].

*Barbarae* appears to be the dominating species in the Santa Barbara region and specimens have been recognized from as far south as San Diego.

*Barbarae* differs from *pubescens* and *rufescens* in particular by its shorter and more robust form, which is similar in the sexes and habitually darker in color, varying from piceous to nigro-piceous with a tinge of rufous now and then, these latter are usually more or less immature or the pigmentation has failed to fully develop. There are some fallacies regarding color in all of the species. In *pubescens* for instance, the color may appear to be more or less nigro-piceous throughout; this darkening is frequently due to an oily exudate which can be removed by immersion in chloroform for an hour or two, the rufous color reappears. Many collectors are unmindful that placing freshly collected specimens in air tight boxes or capsules, prevents evaporation of the body moisture and results in the decomposition of the soft tissues, as recognized by both odor and darkened color of the specimens which is not removed by chloroform. The possibility of arrested pigmentation or immaturity should be taken into consideration. Descriptions should always be drawn up from clean or treated specimens. The author has studied nearly all of the species in the field and realizes that much unnecessary discussion arises from the fallacies noted above.

The smaller specimens of *pubescens* are more difficult to separate from *barbarae,* as the elongate form of the male becomes less evident with diminished size. In *pubescens* the long elytral hairs are fully twice the length of the shorter hairs, while in *barbarae* the hairs are even in length and no longer than the shorter hairs of *pubescens.* In any of the pubescent species the hairs may be broken off, their stubbiness can be seen with a hand lens of sufficient power.

*Barbarae* has been found to occur most frequently in the nests of a small red ant belonging to the genus *Solenopsis.* These ants bite severely and persistently. Very recently the author, while collecting at Santa Barbara, uncovered a large colony of the ants by turning over a rather large, flat rock that was quite firmly but superficially fixed to the soil, and observed five specimens of *barbarae* peacefully feeding at debris among the myriad of ants. Critics who deplore the describing of so many new species, might claim that *barbarae* is only a form of *pubescens,* and that the ants have "bobbed" the elytral pubescence to give it the shortness and evenness that it has. *Pubescens* Lec. occurs as far north as Santa Barbara, few specimens have been taken and are at hand for comparison.

*Genital Characters.*—Male. Edeagophore partly protruded, of the usual flax-seed-shape and arcuate basally. Apicale elongately triangular, depressed, glabrous, extremely and very sparsely punctulate, about two-thirds longer than wide at base; sides slightly arcuate, convergent apically, broadly and feebly sinuate in apical fourth; apex very narrowly truncato-obtuse, feebly emarginate at the dorsal and ventral grooves; disk very feebly convex, groove linear and shallow in apical two-thirds. Ventral surface feebly convex, briefly impressed at tip apicad to the narrow and elongate genital fissure; intromittent organ narrow, subcylindrical, filling the fissure. Basale not exposed, apparently parallel and depressed.

Female. Genital segment triangular, about as long as wide at base and not strongly chitinized. Dorsal plate of each valve rather narrow, lateral border rather strongly arcuate toward base, feebly so apically; surface glabrous, somewhat irregular, very finely and sparsely punctulate, each punctule with a short and fine hair, inner margin rather declivous; apices moderately produced, directed backward, slightly narrowed toward tip, the latter moderately and evenly rounded, slightly concave beneath. Fossae lateral, very shallow; appendages rather stout, cylindromammilliform, about a half longer than wide and with the usual two or three tactile hairs at tip. Ventral surface of each valve rather wide, divided by two sutures into three sclerites; basal sclerite short and transversely oblong, obliquely directed inward and basad, in contact with its fellow of the opposite side, loosely articulated to the middle sclerite, the interval narrowly membranous; middle sclerite transversely quadrato-oblong, about a third narrower than the basal, closely united to the apical sclerite by the nearly transverse linear suture; apical sclerite triangular, true apex small at inner and basal margin of the produced apex; inner margin of the apical and middle sclerites conjointly straight, that of the apical somewhat deflexed; width of interval filled by the pudendal membrane equal to about a fifth of the entire width at middle. Outer margin of the produced apices forming a line-like inner margin of each fossa.

In *pubescens* Lec. (Pl. VI, figs. 4 and 5.) the produced apex of each valve is more strongly produced and narrowed apically; appendages long and cylindrical and the lateral border of each dorsal plate is impressed basad to the fossae. The basal ventral sclerite is longer and more closely united to the middle sclerite, the latter and apical sclerite are wider than in *barbarae.*

**Apsena laticornis** (Casey)

1891. *Eulabis laticornis* Casey, Ann. N. Y. Acad. Sci., vi, p. 59. (Col. Not., iii).

Form oblong-oval, subparallel, more or less narrowed anteriorly, moderately robust and somewhat depressed. Color black, sometimes nigro-piceous; labrum more or less rufous, femora bright rufous, tibiae and tarsi rufo-piceous to black. Luster dull to subopaque. Pubescence microscopical and setigerous, setae very small, except laterally and apically on the elytra where they are noticeably longer but never conspicuous; distinctly longer and recumbent on the abdomen, rufous on the femora.

Head about as wide as long, widest across the eyes, the anterior canthi not more prominent than the latter; sides feebly arcuate, almost straight and converging anteriorly to the rounded epistomal angles, somewhat reflexed and very feebly notched at the oblique sutures, the latter more or less distinct; epistoma truncate at apex; frons moderately convex, surface somewhat irregular, broadly and moderately impressed along the epistomal base, the impression extending on to the middle between the eyes; surface coarsely, densely punctate, the punctures finer, less crowded and more asperate anteriorly. Eyes short and transverse. The middle lobe of the mentum is triangular, subhorizontal and rather narrowly rounded at apex, carina entire; surface quite deeply biimpressed and moderately scabrous. The margins of the middle lobe are thinly beaded and slightly reflexed, clearly defining the small horizontal lateral lobes. Antennae (Pl. II, fig. 8.) unusually stout, almost attaining the pronotal base, the outer joints strongly transverse and compressed, their lateral surfaces distinctly flattened; second joint a little wider than long, third about a fourth longer than wide and about twice as long as the second; sixth to the tenth inclusive subequal in length and gradually incrassate, fourth to the seventh inclusive gradually increasing in width, eighth to the tenth strongly transverse and twice as wide as long, eleventh transversely suboval, one-half wider than long, as wide as the eighth, less so than the two preceding joints.

Pronotum one-fifth to one-fourth wider than long, apex feebly arcuato-truncate, slightly and broadly sinuate opposite the eyes, quite distinctly wider than the base, the latter feebly arcuate and broadly sinuate laterally; apical angles well rounded; sides broadly, evenly arcuate, more convergent and straighter posteriorly becoming feebly sinuate before the basal angles which are obtusangular to briefly rectangular; disk widest a little before the middle, evenly and moderately convex, coarsely, deeply and extremely densely punctate, punctures longitudinally coalescent to greater or less extent, between the linear and convex intervals which reticulately anastomose; surface narrowly impressed along the lateral marginal bead which is slightly reflexed.

Propleurae feebly convex and not strongly longitudinally rugose, the rugae somewhat crenulated, due to the breaking up and atrophy of the rugae, noticeably so toward the lateral pronotal bead, the punctures being partly obscured, and their lower borders marked by the elongate and lunate tubercles; surface flush with the pronotal margin. Prosternum densely less coarsely punctate, punctures less regular and somewhat subasperate; intercoxal process subhorizontal and more or less mucronate at apex.

Elytra one-half longer than wide, oblong-oval, about twice as long as the prothorax and in the middle about one-fourth wider than the latter; sides broadly arcuate, humeri narrowly rounded, slightly prominent and somewhat dentiform, distinctly exposed; abruptly and obtusely rounded at apex; base broadly and feebly emarginate, basal margin unevenly tumid; disk (Pl. I, fig. 5.) broadly flattened and moderately convex, strongly and arcuately deflexed laterally and apically; costae well developed, the first three less so, subacute, carinae narrow, carinal punctules irregularly and widely spaced, varying in size from small to extremely minute points, the larger are subequal to the small paracarinal punctures which are against the carinal margins and separated by a distance equal to two or three times their diameter, these punctures are minutely setigerous, laterally and apically they support very short hairs which are wholly inconspicuous; costae two, four and six nearly attain the basal margin, all are briefly atrophic before the apex and represented by small asperities; strial punctures coarse, deep and circular, under oblique illumination they appear slightly impressed on their posterior margin, separated by a distance equal to one or three times their diameter.

Epipleurae obtusely angulate at base beneath the humeral angle; punctures large, round and shallow, forming an irregular series near the lower margin. Parapleurae densely and closely punctate, punctures large, circular and regular. Meso- and metasternum irregularly and subasperately punctate, punctures rather poorly defined, coarser laterally than centrally.

Abdomen rather closely and strongly punctate, punctures coarser laterally, separated by a distance equal to their diameter or less, surface more or less rugose laterally; fourth and fifth segments more finely and regularly punctate; each puncture with a subrecumbent rufo-ferruginous seta. Rather strongly impressed at middle third on segments one, two and basal part of third.

Legs very stout, moderately long and rather closely and coarsely punctate; the metafemora much longer than the mesofemora, protibiae slightly arcuate, profemora feebly inflated, the mesofemora and metafemora less so.

The secondary sexual characters are not well marked. The males are sometimes slightly narrower than the female and then more parallel; the abdomen is more strongly impressed on the second segment and the profemora are more strongly inflated. In the male the middle lobe of the mentum is more prominent ventrally and the carina thicker and more tumid apically. In the female the carina is thinner and narrowly obtuse at the crest.

Measurements: (Types) Length, 9.2 to 10.0 mm.; width, 3.8 to 4.2 mm.

*Types* are in the Casey collection, United States National Museum. One was contributed by the author and was collected at Poway, San Diego County, California; the other from the Levette collection is without definite locality and is evidently the holotype.

*Distribution.*—CALIFORNIA: San Diego County—(O. N. Sanford, D. W. Coquillett and G. W. Dunn); Poway, (Blaisdell). Los Angeles County—Los Angeles, January 12, 1912, (Van Dyke); Pomona Mts., January 25, 1892, (Coll. Chas. Liebeck). Riverside County—Riverside, February 9, 1890; May 4, (Coll. Chas. Liebeck); Colton, January 12, 1910, (Van Dyke); Beaumont, November 17, 1889, (W. G. Wright); Sobota Springs, June 5, 1917, (E. P. Van Duzee).

A very distinct and fine species Readily recognized by its larger size, very robust antennae, rufous femora and rufo-piceous or nigro-piceous tibiae and tarsi and absence of conspicuous elytral pubescence. *Leachi* differs in the more opaque surface, elytral costae more ogival at summit and the long elytral pubescence. Casey compared *laticornis* with *crassicornis* Casey, the latter belongs to the *rufipes* group and can be quickly recognized by the explanate lateral pronotal margins which are more prominent laterally than the plane of the propleural surface. In *laticornis* the lateral pronotal margins are flush with the plane of the propleural surface. *Laticornis* is frequently found in company with a black ant, *Messor andrei* Mayr.

In the collection of J. O. Martin there is a specimen of *laticornis* which departs from the usual form of that species and it may be characterized as follows:

**Apsena laticornis** var. **subvestita** new variety

General facies of *laticornis* Casey, but with a smaller head and prothorax and therefore noticeably narrowed anteriorly. Elytra pubescent, but not as conspicuously as in *pubescens* Lec., nor *leachi* described below. The legs are bicolored as in *laticornis*, having the tibiae and tarsi rufo-piceous. Otherwise as in *laticornis*.

Measurements: (Type) Length, 9.5 mm.; width, 4 mm.

*Holotype*, of undetermined sex, No. 3015, in the collection of J. O. Martin, Museum California Academy of Sciences. Collected by Mr. Martin at Pasadena, Los Angeles County, California, January 9, 1917.

*Genital Characters.*—Male. Edeagophore (Pl. V, figs. 9A, 9B and 9C.) elongate, somewhat flax-seed-shaped as viewed vertically from above, four and a third times as long as wide and moderately depressed. Apicale triangular, a half longer than wide at base, slightly arcuate when viewed from the side (fig. 9B.); dorsal surface rather strongly convex, median groove fine and apical; sides evenly arcuate in basal half, thence straighter and convergent to apex, the latter narrow and obtusely rounded, base feebly bisinuate. Ventral surface prominent and convex each side and basad to the genital fissure (fig. 9B.), flattened and somewhat concave apically, apical median groove not evident; alae rather broad, each convex from side to side, depressed along the median suture, each mutually tapering in juxtaposition to end subacutely about midway between the inflexed sides of the basale. Basale oblong and parallel, sides feebly arcuate, about three times longer than wide, rather evenly arched as viewed from the side (fig. 9B.); sides arcuately inflexed, rather widely separated by the membranous interval.

Female. Genital segment (Pl. V, fig. 7.) triangular in outline with valves in adduction, as long as wide at base. Each dorsal plate elongately subovate, widest at basal third; lateral borders feebly arcuate, most so basally; apex produced and explanate, not entirely involving the entire width of the plate, it is evenly rounded at tip and in width equal to about half of the plate at apical third, inner margin of the produced apex continued basad as a fine raised line curving outward at a flattened and somewhat membranous area just basad to the fossa, this area is sparsely punctulate and pubescent; surface of the plate is rather broadly and slightly impressed, very sparsely and minutely punctulate, the inner and apical portion of the plate terminating internal to the produced portion. Appendage cylindrical, rather more than a half longer than wide and with two or three long tactile hairs at apex. Ventral surface (Pl. V, fig. 8.) moderately convex, that of each valve divided by two sutures into three sclerites: the basal one is very short, two and a half times wider than long, its long axis directed obliquely inward and basad, very loosely united to the middle sclerite at the basal suture; middle sclerite a little wider than long, inner margin rather strongly arcuate, closely united to the apical sclerite at the apical suture; apical sclerite triangular in outline, the explanate and produced apex defined on the ventral surface as on the dorsal surface and feebly concave beneath the tip; the true apex apparently subchitinous, surface with few punctules and short hairs about the fossa, which is apparently fusiform and slightly rimmed; inner margin of each valve irregular and feebly emarginate at the apical suture, very deeply so at the basal suture. Pudendal membrane finely and longitudinally rugulose.

**Apsena leachi** new species

Form oblong-oval, a little more than twice as long as wide, noticeably slightly narrowed anteriorly, somewhat depressed, moderately robust, resembling *laticornis* Casey in form and size but with the elytra conspicuously pubescent. Color black; femora bright rufous, tibiae and tarsi more or less rufo-piceous. Luster opaque. Pubescence golden brown in color; elytra clothed with long hairs arising from the paracarinal punctures, shorter on other parts of the body.

Head densely and coarsely punctate, punctures on the epistoma rather less strongly marked and shallower, a short decurved seta arises from each puncture; sides of the frons before the eyes moderately arcuate, most so over the antennal fossae, not more prominent than the eyes and moderately convergent to the broadly rounded epistomal angles, a small emargination is present at the oblique sutures; apex of the epistoma feebly arcuate; frons somewhat convex, broadly but not strongly impressed at base of the epistoma, the sutures not evident or indicated by a smooth line. Eyes transverse and narrow, superior extremity slightly wider, arcuately embracing the posterior wall of the antennal fossae. Mentum quite similar in the sexes, wider than long, middle lobe large and triangular, obtusely rounded at apex, not prominent ventrally; carina rather wide, equaling about one-third of the width of the lobe and extends from apex to base, coarsely sculptured; lateral foveae deeply impressed and rather smooth; lateral lobes small and on a little higher plane than the middle lobe, not coarsely sculptured. Antennae (Pl. II, fig. 5.) moderately long, very stout, about attaining the pronotal base, gradually but not strongly incrassate; joints seven to ten inclusive noticeably but not strongly transverse, eleventh slightly irregularly subglobular; distal four joints moderately compressed as viewed edgewise, four to ten inclusive about as wide as long; eight to eleven about equal in width.

Pronotum about as wide as long, apex subtruncate, not beaded at middle, angles broadly rounded; sides broadly and moderately strongly arcuate, less so and straighter posteriorly, becoming slightly sinuate and briefly parallel before the angles, marginal bead thin; basal angles obtusangular to slightly rectangular and distinct; base broadly but not strongly arcuate, obsoletely sinuate laterally, marginal bead rather wide, flat and slightly declivous posteriorly; disk widest a little before the middle, rather more than slightly and evenly convex, coarsely, deeply and extremely densely punctate, punctures toward the sides, apex and base more or less coalescent in longitudinal lines, intervals mere raised convex lines reticulately anastomosing about the punctures, each puncture with a short, nearly recumbent seta; surface narrowly impressed along the marginal bead, the margin feebly reflexed.

Propleurae longitudinally rugose, rugae more or less interrupted and well defined; punctures small and obscured being situated on the upper surface of the rugae; surface plane flush with the lateral pronotal margin and not concave below the bead. Prosternum rather coarsely rugoso-punctate and asperate, each puncture with a long flying hair in the central area.

Elytra about a third longer than wide, oblong-oval, about twice as long as the pronotum, as wide or wider than the prothorax, apex obtusely rounded; sides broadly arcuate, humeri narrowly rounded, somewhat dentiform, prominent and distinctly exposed; base broadly, feebly emarginate, margin unevenly tumid; disk less than moderately convex, rapidly and strongly, arcuately declivous at the sides and apex, costae (Pl. I, fig. 6.) strongly marked, except at apex, most prominent laterally, more or less subogival at summit with the intervals almost subangulate at bottom; carinal punctules widely spaced, alternating more or less in size; paracarinal punctures against the carinal margins, from each arises a more or less long and erect, rather coarse hair, all of the punctures in about apical third with long conspicuous hairs that are longer and coarser than in *pubescens* Lec.; strial punctures circular, distinctly defined, moderately deep, each with a very short seta. Scutellum short and transverse, not wider than the basal margin.

Epipleurae upwardly uncinate beneath the humeri; margins uniting some distance before the elytral apex, intervening surface coarsely, irregularly and somewhat deeply punctate. Parapleurae densely punctate, punctures large, circular and shallow, quite discrete, each with a short seta that is recumbent within its boundary; epimera likewise punctate. Meso- and metasternum irregularly and asperately rugoso-punctate, punctures not well defined.

Abdomen very coarsely and closely punctate, punctures round and strong, separated by a distance equal to their own diameter or less, those of the fifth segment are smaller and sparser; each puncture gives origin to a rather long and semirecumbent seta. Third and fourth ventral sutures deeply impressed. Legs stout, moderate in length, metafemora much longer than the mesofemora as in *laticornis* Casey; femora gradually wider and stouter toward apex.

Male. Usually narrower than the female, sometimes not noticeably so. First abdominal segment moderately strongly convex at middle and moderately impressed behind each coxa; second segment broadly and rather strongly impressed in middle third, the third less so in its basal half. Profemora gradually wider apically and slightly inflated.

Female. Usually broader. First abdominal segment not convex at middle; broadly but not strongly impressed at middle on segments two and three, the entire impression appears oval when viewed lengthwise.

Measurements: (Types) Length, 10.5 to 12 mm.; width, 4 to 5 mm.

*Holotype.*—Female, No. 3010, and allotype, male, No. 3011, in the Museum of the California Academy of Sciences. Collected on June 8–20, 1928, at California Hot Springs, Tulare County, California, by Mr. E. R. Leach of Piedmont, Alameda County, California.

*Paratypes.*—Four in the collection of Mr. Leach, one in that of the California Academy of Sciences and one deposited in the U. S. National Museum by Mr. Leach. All taken at the same time and place.

A very distinct species resembling *laticornis* Casey in habitus, but with the body surface opaque and the elytra conspicuously pubescent; the hairs are longer and coarser than in *pubescens* Lec.; the summits of the elytral costae form a sharper angle than in any other species. In *laticornis* the surface luster is a dull black and the elytral punctures are minutely setigerous.

*Genital Characters.*—Male. Edeagophore (Pl. V, figs. 6A, 6B and 6C.) elongately flax-seed-shaped, about four and a half times as long as wide. Apicale triangular and depressed, three-fourths longer than wide, sides moderately arcuate in basal half, thence straighter and convergent to the obtuse and slightly emarginate apex; superior surface flattened, a median linear groove extends from apex to basal fifth, very sparsely punctulate laterally, base feebly arcuate. Ventral surface with the inflexed alae broad and moderately convex in profile, sparsely punctulate laterally; genital fissure ovate and filled by the rather broad intromittent organ; median groove distinct apicad to the fissure where the surface is impressed; the alae unite at suture on the median line, each acutely triangular between the inflexed sides of the basale. Basale parallel, semicylindrical and moderately depressed, scarcely three times as long as wide, rather evenly arcuate when viewed laterally, inflexed sides widest at middle beneath, membranous interval about as wide as an inflexed side.

Female. Genital segment (Pl. V, fig. 4.) triangular in outline with the valves in adduction, about as long as wide at base; lateral border of the dorsal plate quite rapidly converging apically and more or less broadly sinuate opposite to the fossa; apices moderately produced with tip broadly rounded, with the upper surface feebly convex; sides basad to the fossae rather broadly flattened and submembranous and the surface sparsely punctulate, each punctule with an erect, short and fine seta. The inner margins of the plates are rather straight and the surface of each feebly, irregularly convex. Appendages rather short and subconical, each with two or three long tactile hairs at tip; fossae lateral in position. Ventral surface (Pl. V, fig. 5.) of each valve more or less convex, divided by two transverse sutures into three sclerites, which are somewhat loosely united at the sutures. Basal sclerites short and transverse, contiguous on the median line in adduction, each slightly and obliquely directed inward and basad, sparsely punctulate laterally, punctules with short hairs. Middle sclerites wider than long, punctulate and with fine hairs. Apical sclerites feebly convex, submembranous at tip beneath and at base of the explanate and concave apex of the dorsal plate; surfaces very sparsely punctulate and piliferous. Inner margin of the middle and apical sclerites nearly straight, but subemarginate at base of the explanate apex. Pudendal membrane longitudinally rugulose as usual.

**Apsena grossa** (LeConte)

1866. *Eulabis grossa* LeConte, Smiths. Misc. Coll., vi, No. 167, 2d ed., p. 118, April. (New Species Col.).

1870. *Eulabis grossa* Horn, Proc. Am. Philos. Soc., xiv, p. 324. (Revision Tenebr.).

1891. *Eulabis grossa* Casey, Ann. N. Y. Acad. Sci., vi, p. 59, Nov. (Col. Not., iii).

Form slightly elongate, subovate, a little more than twice as long as wide, very moderately narrowed anteriorly, elytra more or less but not strongly inflated. Color black, tibiae and tarsi more or less piceous. Luster dull to more or less opaque. Setae of the body extremely minute.

Head about as wide as long, frons slightly convex, impressed about the eyes and along the frontal suture, the latter feeble and more or less interrupted by the dense and coarse punctation, punctures smaller on the epistoma, sides slightly prominent and arcuate just before the eyes, thence convergent and straighter, frequently broadly and feebly arcuate to the well rounded epistomal angles, at times slightly emarginate at the oblique sutures; epistomal apex truncate; labrum transverse, finely punctate, sparsely pubescent, hairs short, apical margin with a dense fringe of golden hairs. Maxillary palpus (Pl. I, fig. 15.) has the second joint elongate, obconical and about twice as long as wide; third joint similar in form, slightly arcuate and a little shorter than the second; fourth dilated and triangular, outer border about four-fifths longer than the inner, apical margin a fifth longer than the latter. Antennae (Pl. II, figs. 1 and 2.) comparatively slender, slightly incrassate, joints eight to ten inclusive slightly transverse, four to seven about as long as wide, third elongate and about a half longer than wide, second equal in length to the fourth—exposed neck of the condyle not included.

Pronotum about a third wider than long and about twice as wide as the head; apex truncate in feeble circular arc, marginal bead obsolete, angles rounded; sides evenly and moderately strongly arcuate, sometimes less so behind the middle, marginal bead feeble to obsolete; base very feebly arcuate, bead feeble and flat, angles distinct and obtuse; disk moderately and quite evenly convex, densely punctate, punctures moderately coarse, more or less coalescent in longitudinal series of two to four, especially laterally, intervals linear and convex, reticulately anastomosing about the punctures.

Propleurae very coarsely punctate and more or less rugose; surface plane flush with the lateral pronotal margin. Prosternum coarsely and rather discretely punctured; intercoxal process more or less margined.

Elytra about a third longer than wide, variable according to size and inflation, about two and a half times the length of the pronotum; base feebly emarginate, margin irregular and not strongly marked, humeri obtuse, angle distinct and not in the least prominent; sides broadly arcuate, apex obtusely rounded; disk moderately convex, slightly depressed in the central area, arcuately declivous at the sides and apex; seven costate (Pl. I, fig. 1.), costae narrow, feebly elevated, carinae smooth, each with a single series of small and very widely spaced punctules, those of the apical declivity slightly muricate, intercostal surface moderately closely and irregularly punctate, paraçostal series not distinct, strial punctures moderately large and separated by a distance equal to two or three times their diameter. The irregular punctures of the intercostal intervals constitute a parastrial series, which are vestigial in the other species.

Epipleural punctures smaller and sparser than on the elytral disk; basal margin obtusely rounded. Sterna, parapleurae and epimera (Pl. V, fig. 14.) densely and coarsely punctate.

Abdomen moderately convex, coarsely punctate laterally and basally, more or less rugose; punctures of the central area separated by a distance equal to one or two times their diameter. First and second sutures straight, third and fourth moderately arcuate and deeply impressed; fourth segment short, about half the length of the third, which is a little shorter than the second; fifth segment rather strongly convex and more finely punctate. Legs (Pl. IV, figs. 1A, 1B and 1C.) moderate in length and slenderness; tarsi not stout.

Male. Form usually smaller and less inflated. Abdomen broadly and more or less impressed at middle third of segments one and two. Middle lobe of the mentum (Pl. II, fig. 13.) moderately large, deeply impressed each side of the carina at base; middle lobe somewhat prominent ventrally, surface transversely convex apically, subscabrously punctate, defined from the lateral lobes by the prominent anterior margins of the foveate impressions; lateral lobes quite horizontal and less strongly sculptured.

Female. Form usually larger and the elytra more inflated. Middle lobe of the mentum triangular, broader and less convex, but slightly more prominent ventrally than the lateral lobes; basal impressions usually larger and extend farther forward, almost to the apical margin, rendering the basal half broadly subcarinate at middle; punctures a little coarser than in the male.

Measurements: Length, 11 to 15.8 mm.; width, 4.5 to 7 mm.

*Type* in the LeConte collection of the Zoological Department of Harvard University, Cambridge, Massachusetts. Collected by Dr. J. G. Cooper, on San Clemente Island off the coast of Southern California.

*Distribution.*—San Clemente Island, October, 1912. Santa Barbara Island, October 1, 1913. San Nicholas Island, July 12, 1911. Santa Catalina Island (Van Dyke Coll ).

*Grossa* Lec. is the largest species of the genus *Apsena* Lec. and has a distinctive facies. It differs from all other species of the genus in having black legs; the body surface is very minutely and microscopically reticulo-granulate. Being insular, there is no reliable and authentic record of it ever having been taken on the mainland. Specimens in the Coquillett collection, U. S. National Museum, have Los Angeles labels. Seven specimens in the Horn collection (Amer. Ent. Soc. Coll.) are labeled H 7372, three were taken at the type locality.

*Genital Characters.*—Male. Edeagophore (Pl. V, figs. 3A, 3B and 3C.) elongately flax-seed-shaped, about five times as long as wide. Apicale much flattened, apical half angularly deflexed as viewed from the side (Pl. V, fig. 3C.), about a fourth less than twice as long as wide, triangular, dorsal surface flat, median groove fine in about apical four-fifths; sides feebly arcuate and subparallel in basal half, thence convergent and very broadly, feebly sinuate to the obtuse and slightly emarginate apex; base feebly arcuate. Ventral surface feebly convex across at the subfusiform genital fissure, sparsely punctulate lateral to the fissure, apicad to which the surface is flat with the median groove distinct; the alae are rather broad and gradually narrowed between the inflexed sides of the basale. Intromittent organ broad, rounded at apex and filling the genital fissure. Basale semicylindrical, sides parallel and very slightly arcuate, surface strongly rounded into the inflexed sides; about three times as long as wide as viewed from above, strongly arched in basal half; inflexed sides rather narrow and defined from the arcuate sides by a fine linear angulation; membranous interval moderately wide.

Female. Genital segment (Pl. V, fig. 1.) triangular when the valves are in adduction, apex subtruncate, about as long as wide at base. Dorsal plate of each valve elongately oblong, quite equal in width throughout, about four times as long as wide; surface plane to feebly impressed; sides parallel, nearly straight, apex moderately explanately produced and semicircularly rounded, as wide as the plate; surface extremely sparsely punctulate, each punctule with a short hair. Appendages mammilliform, about a half longer than wide and with the usual two or three tactile hairs at tip.

Ventral surface (Pl. V, fig. 2.) of each valve moderately convex, divided by two transverse sutures into three sclerites: the basal one transverse, about twice as wide as long, directed inward and slightly basad; middle sclerite transverse, about a half wider than long and rather loosely united to the basal at the suture; apical sclerite longer than wide, narrowed apically, its apex finely punctulate and pubescent, closely united to the middle sclerite at the suture, surface of both very sparsely punctulate, each puncture with a short hair. A fine raised line runs obliquely across the surface of the apical sclerite, from middle of its lateral border to the inner edge of the explanate apex—this line is of unknown significance. Inner margin of the middle and apical sclerites is nearly straight, broadly emarginate at the basal suture. Pudendal membrane rather finely longitudinally but not very distinctly rugulose.

The genital characters of the male present very little that is different from the other species: the inflexed sides of the basale being defined by a linear angulation from the dorsally inflexed surface is the most evident departure from the other species. In the female the elongate dorsal plate, of equal width with broadly rounded apex, and the oblique line on the ventral surface of the apical valvular sclerite, are the best differential characters.

### *Synopsis of the Rufipes Group*

Body form similar in the sexes .. . ......................1

Body form different in the sexes: Males noticeably narrower, more elongate; elytra nearly transversely semicircularly convex. Female noticeably a little more robust, elytral disk broader, slightly depressed and only moderately convex; third antennal joint elongate. Luster more or less dull. (Syn. *montanus* Casey) ....... ... .......*rufipes* Esch.

1. Form more parallel, size smaller.................. .....2

Form robust, larger size, prothorax more transverse; antennal joints five, six and seven quite equal and less transverse; elytra moderately convex on the disk... .*crassicornis* Casey

2. Body form of the male like that of the female, not elongate but similarly robust; elytral disk only moderately convex; luster distinctly opaque...... .*rufipes* var. *opaca* n. var.

Body form of the female like that of the male: elytra similarly convex, not wider than the pronotum and transversely subcylindrically convex; pronotal punctation more or less discrete and less strongly reticulately rugose in the central area; third and fourth antennal joints equal to subequal in length; luster more or less shining.
*rufipes* subsp. *simplex* n. subsp.

**Apsena rufipes** (Eschscholtz)

1829. *Eulabis rufipes* Eschscholtz, Zool. Atlas, III, p. 15.

1848. *Eulabis rufipes* Mannerheim, Bull Mosc., XVI, 2, p 264.

1859. *Eulabis rufipes* Lacordaire, Th., Hist. Nat. d. Ins , Gen. des Col., v, p. 133.

1870. *Eulabis rufipes* Horn, Philos. Soc., XIV, p 324. (Revis. Tenebr.).

1891. *Eulabis rufipes* Casey, Ann. N. Y. Acad. Sci., VI, p. 59, Nov. (Col. Not., III).

1924. *Eulabis montanus* Casey, Mem. of the Col , XI, p. 330. (Addit. to N. Amer. Col.).

1925. *Eulabis montanus* Blaisdell, Ent. News, XXXVI, p. 83, March.

Form parallel and rather elongate to oblong-oval, convex to somewhat depressed, about two and a half times as long as wide. Color nigro-piceous, sometimes more or less rufo-piceous; trophi, antennae and legs rufous, head often in part rufous. Pubescence microscopical throughout, very minutely setigerous under moderate power. Luster feebly shining to dull or moderately opaque.

Head a little wider than long, widest across the anterior canthi; sides before the eyes very feebly arcuate, almost straight and a little reflexed, moderately convergent to the rather broadly rounded epistomal angles, not notched at the oblique sutures, epistomal apex truncate; frons feebly convex, broadly but not deeply impressed along the sutures, very densely punctate, punctures rather large and more or less coalescent, smaller and nearly discrete on the epistoma and reflexed margins of the frons. Labrum usually retracted beneath the epistoma. Genae moderately convex and coarsely punctate. Mentum about as long as wide, middle lobe of moderate size, carinate on the median line, carina rather narrow; apex arcuate between the more or less exposed lateral lobes which are rather prominent anteriorly; surface not deeply impressed lateral to the carina and not strongly scabro-punctate. Antennae (Pl II, fig. 10.) about attaining the pronotal base, less than moderately stout, very gradually incrassate in outer six joints; second joint about as long as wide, its length quite equal to those of joints five to ten not including the condylar petiole; third about a third longer than wide and two-thirds longer than the second; fourth distinctly longer than the fifth and following joints, the fifth about a third wider than long (exclusive of the petiole); tenth one-half wider than long, eleventh somewhat oval, rather irregularly rounded at apex and about as long as wide, not wider than the tenth; outer five joints moderately compressed.

Pronotum (Pl. I, fig. 16.) about a third wider than long; apex arcuato-truncate and feebly sinuate within the angles which are narrowly rounded and slightly prominent anteriorly; sides broadly and quite evenly arcuate, slightly oblique to feebly sinuate before the basal angles which may be obtusangular or subrectangular; base broadly arcuate and very slightly sinuate laterally, about a fourth wider than the apex; disk rather evenly and moderately convex, becoming narrowly impressed along the somewhat explanate lateral margin, the latter very feebly reflexed and more prominent than the plane of the propleural surface, very densely and coarsely punctate (Pl. IV, fig. 9.), punctures more or less coalescent in irregular longitudinal lines, the intervals narrow, convex anastomosing lines enclosing the punctures.

Propleurae finely longitudinally rugose, rugae more or less reticulate in the submarginal area, the small punctures more or less exposed, each with a short and extremely fine seta; surface broadly but not strongly concave beneath the explanate pronotal margin (Pl. V, fig. 17.), the latter almost smooth. Prosternum coarsely and more or less confluently punctate, central area with short erect hairs.

Elytra about one-half longer than wide, base feebly emarginate, humeri small and dentiform and slightly prominent; sides broadly and evenly arcuate, apex moderately broadly rounded; disk moderately convex according to sex, strongly and arcuately declivous apically; first three or four costae (Pl. I, fig. 8.) more or less feebly elevated, becoming well developed and rather strong laterally, all the costae well developed on the apical declivity, the first or sutural, second and third of each elytron parallel and entire, ending abruptly at the narrowly impressed submarginal area; costae two, four and six only slightly abbreviated at base, seventh straight from the humeral apex; carinae well defined, narrow and quite even, carinal punctules very small, widely spaced and inconspicuous as usual; paracarinal punctures small, separated by a distance equal to two to four times their diameter and located against the carinal margins; strial punctures moderately small, not deep, slightly elongate and their posterior margins apparently evanescently impressed as seen under oblique illumination, separated by a distance equal to two to four times their diameter.

Epipleurae rather closely and irregularly punctate, punctures small, about the size of the strial; basal margin subangulate below the humeri (Pl. IV, fig. 3.). Parapleurae, meso- and metasternum coarsely punctured, punctures large, round and shallow.

Under surface of the body more or less shining. Abdomen coarsely punctate, punctures smaller than on the metasternum, separated by a distance equal to one to three times their diameter, slightly larger with a few rugae laterally on segments one and two Surface glabrous, slightly impressed at middle of the first two segments and basal part of the third in both sexes. Legs (Pl. III, figs. 2A, 2B and 2C) moderate in length; profemora rather strongly inflated, meso- and metafemora moderately clavate, being somewhat inflated in distal half

Male. Usually more parallel, elytra not wider than the pronotum and therefore appearing more elongate, the elytra are more strongly convex from side to side and the costae more prominent; sometimes there is but slight difference in form between the sexes in the smaller individuals. Mentum a little more strongly lobed at middle and the carina more tumid with the crest more or less truncate apically, forming an ovate smooth area. Abdomen rather more strongly impressed on the second segment.

Female. Usually a little more robust with the elytra more flattened and less convex on the disk. Middle lobe of the mentum less developed and with the carina narrower and smaller.

Measurements of specimens from the type region: Males: Length, 6 to 7 mm ; width, 2 to 2.5 mm. Females: Length, 6 to 7 mm.; width, 2.5 to 2.8 mm.

*Type* in the Eschscholtz collection: "Sammlg. via Welt an Mus. Zurich. Moskau, ausbeute seiner I. Welt-Reise ex parte an Mus. Dorpat."[7]

*Type region.*—"In Californien bei St. Franzisco in der Nahe der Mission."[8]

*Distribution.*—CALIFORNIA: San Diego County—San Diego, (O. N. Sanford, G. W. Dunn, F. E. Blaisdell; Coll. Chas. Liebeck); Poway, (F. E. Blaisdell). Los Angeles County—Los Angeles, (D. W. Coquillett, U. S. Nat. Mus.). Kern County—Keene, (H. F. Wickham, Coll. Amer. Ent. Soc.). Monterey County—Marina, (S. L. Slevin, F. E. Blaisdell); Pacific Grove, (E. C. Van Dyke, S. L. Slevin). Santa Cruz County, June, 1906. Fresno County—Dalton Creek, May 15, 1920, elev. 4800 ft., (Henry Dietrich). Madera County—Chiquita Creek, July 21, 1920, elev. 4100 ft., (Henry Dietrich); Northfork, March 1–14 and February 29, 1920, (Henry Dietrich). Tulare County—Sierra Nevada Mountains, (Warwick Benedict). Calaveras County—Mokelumne Hill, June 26, 1921; Davis Meadow near Railroad Flat, June, 1903, (F. E. Blaisdell). Eldorado County, (E. C. Van Dyke and Coll. Thos. L. Casey, U. S Nat. Mus.) Amador County—Clipper Gap, June 5, 1930, (E. C Van Dyke). Tuolumne County, May 15, 1914, (F. W. Nunenmacher). Marin County, (F. E. Blaisdell). San Francisco County, September 30, 1908; May 30, 1911; October 4, 1908, (F. E. Blaisdell, E. C. Van Dyke). San Joaquin County—Black Lands, between Stockton and Lodi, April 12, 1931, (F. E. Blaisdell).

Before entering upon a discussion of the variations presented by specimens from the different regions, I wish to repeat the original description of *rufipes* Esch., namely:

*Eulabus rufipes*, thorace aciculato, aequali, lateribus rotundato; elytris convexiusculis costatis. Lange 2 bis 4 Linien.

The differential characters of *rufipes* have been given under the discussion of sex. The species is readily separated from all other members of the genus *Apsena*, other than those of the *rufipes* group, by the explanate lateral pronotal margins, which project beyond the plane of the propleural surface. The *rufipes* group includes but one distinct species heretofore described other than *rufipes*, namely, *crassicornis* Casey. The latter is a valid species and need not be further considered at present. This leaves, then, only those variants that are usually referred to *rufipes* Esch. In *rufipes* the form of the two sexes is different. In the subspecies described below the female resembles the male in body form. In examining series from the different localities it has been noticed that there is a group of specimens which are opaque in luster and the form of the sexes similar, the male resembling that of the female, and some of the individuals are among the smallest of those referable to *rufipes*. I deem this phase worthy of at least a varietal name as follows:

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[7] Suppl. Ent., Nr 12, p. 43, (1926).

[8] Eschscholtz, Zool. Atlas, III, p. 15, 1829.

**Apsena rufipes** var. **opaca** new variety

Form oblong-oval, somewhat robust and slightly narrowed anteriorly, similar in the sexes. Color black, head, pronotum and under surface of the body rufo-piceous; legs and antennae dark rufous. Surface opaque.

Pronotal disk densely and moderately coarsely punctate, punctures more or less longitudinally coalescent, the intervals forming fine reticulate anastomosing lines.

Elytra oblong-oval, a half longer than wide, flattened on the disk and moderately convex.

Abdomen impressed in middle third of segments one, two and basal part of three in both sexes. Profemora moderately inflated in apical two-thirds; meso- and metafemora noticeably slightly inflated in apical half and rather rapidly narrowed at basal third.

Measurements: (Types) Length, 5.5 to 6 mm.; width, 2.4 to 2.5 mm.

*Holotype.*—Female, No. 3012, and *allotype*, male, No. 3013, in the collection of J. O. Martin, Museum California Academy of Sciences. Collected by Mr. Martin at Pasadena, California, March 16, 1916.

*Paratypes:* Twenty-four specimens distributed in the following collections as follows: United States National Museum, American Entomological Society, Academy of Natural Sciences of Philadelphia, and in that of Chas. Liebeck of Philadelphia, J. O. Martin and that of the author, Museum of the California Academy of Sciences, San Francisco, California.

*Distribution*.—CALIFORNIA: San Diego County—San Diego and Poway, (F. E. Blaisdell). Los Angeles County—Los Angeles, (E. C. Van Dyke and L. J. Muchmore); Pasadena, (J. O. Martin, H. C. Fall and A. Fenyes). Monterey County—Carmel, March 25, 1917, (L. S. Slevin) Kern County—Cottonwood Creek, April 15, 1917, (G. D. Hanna). Calaveras County—Mokelumne Hill, June 23, 1921, (F. E. Blaisdell). San Francisco, August, 1915; May 30, 1911, (E. C. Van Dyke, F. E. Blaisdell).

The propleurae are rather feebly longitudinally rugose, the rugae are more or less disintegrated in the submarginal area, the segments forming small asperities instead of lunate tubercles; punctures very small and not well defined, each with a short and very fine seta.

The pubescence is microscopical, consisting of extremely minute setae, except on the abdomen where the punctures bear relatively long hairs which are recumbent, those of the prosternum are short and erect.

Like other members of the Eulabes, *rufipes* and its variants frequent the nests of ants or their vicinity. Mr. Henry Dietrich found the form named *montanus* by Casey associated with *Camponotus vicinus* Mayr. The author has often found it with *Messor andrei* Mayr.

In 1924, Col. Thos. L. Casey described *Eulabis montanus* from a specimen collected in Eldorado County, California. He stated that it is a "rather elongate species, larger than *rufipes* and with relatively narrower hind body, thicker and somewhat longer antennae" (Pl. V, fig. 12.), giving the measurements of the type as follows: length, 6.7 mm., width, 2.2 mm.

*Montanus* resembles *crassicornis* more or less in size as regards length, it being elongate and narrower, while *crassicornis* is distinctly robust and of similar form in the sexes. Dr. Horn's series (Collection of the Amer. Ent. Soc.) of *pubescens* Lec. contained both *montanus* and *crassicornis;* both were as large as the smaller specimens of *pubescens*, both are glabrous and not pubescent as in the latter. They were probably referred to *pubescens* on account of size without proper study of the differential characters.

Mr. Henry Dietrich of Lucedale, Mississippi, collected a considerable series of the form referable to *montanus,* at Northfork and Chiquito Creek, Madera County, at an elevation of 7000 ft., and at Dalton Creek in Fresno County, at an altitude of 4800 ft. The individuals ranged in size from the largest to the smallest of those found in the type region—Mission District of San Francisco, and if the specimens from the two regions were mixed it would be impossible to separate them as before.

I see no reason why *montanus* Casey should be considered even as a variety, as indicated by similar specimens from San Francisco. There are all degrees of intermediates between the extremes, both in Central and Southern California. *Montanus* is simply a form of *rufipes* Esch. which has a wide distribution. *Montanus* has the facies of *rufipes*, while *simplex* described below and *opaca* defined above have a noticeable different facies from typical *rufipes*, especially in the relative form of the sexes. *Rufipes* and its variants as well as *crassicornis* are characterized as a group by the explanate lateral margins of the pronotum, which project beyond the plane of the propleural surface.

*Genital Characters.*—Male. Edeagophore (Pl. III, figs. 6A, 6B, and 6C.) elongately flax-seed-shaped as viewed from above, about four times longer than wide and depressed. Apicale triangular, about three-fourths longer than wide at base; dorsal surface moderately convex, very finely punctulate laterally toward the apex, the latter narrowly obtuse and feebly emarginate, dorsal groove fine in apical half; sides moderately arcuate, less so apically; base subtransverse. Ventral surface moderately convex and somewhat prominent opposite to basal half of and basad to the genital fissure; surface rather broadly impressed on the median suture basad to the fissure, distinctly so apicad to the fissure; alae broad and rapidly narrowing between the inflexed sides of the basale. Genital fissure rather narrowly subfusiform and filled by the rather narrow intromittent organ. Basale very strongly and semi-circularly arched in basal half; sides slightly arcuate, dorsal surface moderately convex; inflexed sides rather broad with the membranous interval moderately narrow.

Female. Genital segment (Pl. III, fig. 4.) triangular, rather broad, a little shorter than wide, apex quite obtusely rounded. Valves somewhat inwardly arched. Dorsal plates moderately narrowed toward apex, sides rather strongly arcuate, base well rounded, inner margins broadly but not strongly sinuate from near base to near apex, the latter not in the least produced, but formed by a well defined stylifer; dorsal surface slightly and broadly impressed, punctate apically and laterally just basad to the stylifer, each puncture with a short hair. Stylifer inwardly arched at tip forming the apex of the valve. Appendages cylindrical, slightly narrowed basally at times, about twice as long as wide, obtusely rounded at tip, with two or three long tactile setae at apex. Ventral surface (Pl. III, fig. 5.) rather evenly convex, that of each valve scarcely wider than a dorsal plate. Surface of each valve divided by two sutures into the usual three sclerites; basal sclerite arcuate, shorter than wide, directed inward and somewhat basad, loosely articulated at the basal suture with the middle sclerite, the latter obliquely subovate, inner margin arcuate, closely articulated with the apical sclerite at the rather oblique apical suture; apical sclerite elongate and triangular, surface moderately convex and the inner margin nearly straight apically, very broadly emarginate at the basal suture; both the middle and apical sclerite sparsely punctate, each puncture with a short hair. True apex beneath the tip of the stylifer. Pudendal membrane finely longitudinally rugulose and quite broadly exposed above when the valves are in full adduction.

Both types of *opaca* have the aedeagi exposed; that of the female is quite like that of typical *rufipes*. In the male the edeagophore is elongate and slender, with the basale well arched, depressed and with a faint median groove apically on the dorsum; the apicale is triangular and well depressed, dorsal groove rather broad, apex minutely emarginate; ventral surface rather strongly convex and prominent, each side of and basad to the genital fissure, apically the surface is impressed. The surface appears to be very finely and sparsely punctulate.

**Apsena rufipes** s. sp. **simplex** new subspecies

Form small, oblong-oval, quite parallel and moderately convex, about two and a half times as long as wide, facies very much like that of *Tonibius sulcatus* Lec. Color nigro-piceous; head and prothorax rather rufo-piceous; antennae and legs rufous. Luster moderately shining, surface not pubescent.

Head slightly wider than long, not quite as wide as the pronotal apex; anterior canthi scarcely more prominent than the posterior, sides before the eyes briefly and slightly arcuate, thence almost straight and moderately convergent to the well rounded epistomal angles, very feebly reflexed and not in the least emarginate at the oblique sutures; epistoma truncate at apex. Frons very slightly and irregularly convex, broadly and feebly impressed on the frontal suture, the latter obsolete, densely and closely punctate, not rugose, punctures moderately coarse. Eyes narrowly reniform, rather obliquely transverse, dorsal portion slightly larger. Middle lobe of the mentum rather flat, apex ogival, margined, defining the lateral lobes; carina narrow and not quite attaining the base, surface not deeply foveate laterally toward base. Antennae (Pl. II, fig. 11.) somewhat short and slender, outer five joints moderately compressed, slightly incrassate; joints three and four equal in length or very nearly so and as wide as long, three to ten inclusive subequal in length, three to six about as long as wide, seven to ten gradually increasing in width, tenth about twice as wide as the third, eleventh irregularly rounded and as wide as long.

Pronotum about a fourth wider than long, apex feebly arcuate in feeble circular arc, not beaded, quite as wide as the base, angles obtusely rounded; sides quite evenly, broadly and moderately arcuate, scarcely sinuate before the basal angles, not distinctly beaded; basal angles obtusangular, with base quite transverse and marginal bead not distinct; disk evenly and very moderately convex, densely punctate, intervals scarcely convex in the central area where the punctures are more or less discrete, coarse, rounded to oval, separated by a distance less than their own diameter to one to two times the same; laterally the punctures are in longitudinal series of two to four and the intervals more convex and more or less anastomosing; submarginal surface moderately narrowly and feebly impressed, somewhat reflexed. The impressed border is more prominent laterally than the plane of the propleural surface. Propleurae longitudinally and rather finely rugose, punctures small and not well defined between the rugae, each with a very short and inconspicuous seta; surface very broadly concave beneath the lateral pronotal margin rendering it explanate. Prosternum irregularly and not strongly rugosopunctate, the process arcuate between the coxae.

Elytra one and a little less than a half longer than wide, not wider than the pronotum, costate; costae not strongly developed, the sutural obliterated except apically and basally, second scarcely elevated, others very slightly increasing in elevation, becoming distinct on the lateral and apical declivity; carinae narrow and dull in luster, carinal punctules scarcely discernible, paracarinal punctures very small and against the carinal margins; strial punctures slightly oval and moderately coarse; base transverse, about equal to the pronotal base, margin irregular, scutellum entirely marginal, humeri feebly dentiform; sides broadly arcuate and subparallel, apex parabolically rounded; disk moderately and rather evenly convex from side to side, somewhat strongly and arcuately declivous laterally, more gradually so apically.

Epipleurae not strongly uncinate at base, basal margin obtusely rounded; surface rather densely punctate, punctures moderate in size. Mesosternum rugoso-punctate, punctures not sharply defined, while those of the metasternum are distinct. Mesosternal parapleurae are somewhat irregularly subrugosopunctate, punctures not distinctly defined. Metasternal episterna coarsely punctate, punctures well defined, epimera small with punctures distinct.

Abdomen shining, rather strongly and densely punctate, punctures separated by a distance equal to one or two times their diameter, scarcely smaller on the fifth segment, although somewhat smaller and sparser on the second; second segment about twice as long as the fourth and a third longer than the third.

Legs moderate in length and stoutness; tarsi moderately short and rather robust.

Males. Third antennal joint slightly longer than wide, subequal to the fourth. Abdomen feebly impressed on middle third of the first three segments.

Measurements: (Type) Length, 5.5 mm.; width, 2 mm.

*Holotype.*—Male, No. 3014, in the collection of Dr. E. C. Van Dyke, Museum of the California Academy of Sciences. Collected by Dr. Van Dyke at Fort McDowell, Angel Island, Bay of San Francisco, off the shore of Marin County, California.

*Paratypes* are located as follows: Entomological Department of the University of Kansas; collection of The American Entomological Society, Academy of Natural Sciences of Philadelphia; collection of Hubbard and Schwarz, United States National Museum, Washington, D. C.; others in the author's collection, Museum of the California Academy of Sciences, and three labeled "San Bernardino County, California" in the collection of Chas. Liebeck, Philadelphia.

*Distribution.*—Besides the localities mentioned above, the author collected five specimens on June 8, 1914, at Dipsea, west coast of Marin County, California.

The Dipsea specimens represent both sexes, they are moderately shining and the interstitial surface of the pronotum in the central area is rather more convex and as wide as in the type; the first three elytral costae are entire apically as in *rufipes* Esch. and the body form is the same in the sexes, the elytra are not wider than the pronotum. The third antennal joint is very slightly longer than the fourth, in the type those two joints are equal.

*Simplex* departs quite noticeably from typical *rufipes* by its shining surface, rather more simple pronotal sculpturing, narrower and more parallel form in the sexes, although the first three costae of each elytron are not so constantly entire on the apical declivity. *Simplex* appears to be a species in the making. The aedeagi are exposed in part of the specimens rendering the diagnosis of sex certain.

*Genital Characters.*—Male. Edeagophore parallel and strongly arcuate. Apicale triangular, depressed, dorsal surface slightly convex, median groove fine and quite entire; sides moderately arcuate in basal half, thence straighter and convergent to the obtusely rounded apex; base feebly arcuate. Ventral surface quite convex and prominent in basal two-thirds, impressed apical to the narrowly oval genital fissure.

Female. Genital segment triangular as usual with the valves in adduction. Dorsal plate of each valve moderately impressed on the surface, sparsely and finely punctulate, each punctule with a fine minute hair; lateral margin converging apically, inner margin straight; stylifer distinct, with few longer hairs, apex similar to that in *rufipes*. Appendage cylindrical, about twice as long as wide, with two or three long tactile hairs at apex. Ventral surface of each valve divided by two sutures into three sclerites: the basal short and wide, obliquely directed inward and basad; middle sclerite subquadrate and the apical triangular, at tip forming the small true apex internal to that of the stylifer, which is not inwardly curved at apex. The internal margin of the middle and apical sclerites conjointly arcuate, widely and triangularly emarginate at the basal suture. Surface of the sclerites punctate, each puncture with a short hair.

**Apsena crassicornis** (Casey)

1890. *Eulabis crassicornis* Casey, Ann. N. Y. Acad. Sci., v, p. 404, Nov. (Col. Not., ii).

1891. *Eulabis crassicornis* Casey, Ann. N. Y. Acad. Sci., vi, p. 59, Nov. (Col. Not., iii).

1925. *Eulabis crassicornis* Blaisdell, Ent. News, xxxvi, March, p. 79. (Col. Pacific Coast: Notes and Criticisms).

Form oblong-oval, slightly narrowed anteriorly, a little more than twice as long as wide and moderately convex. Color very dark rufo-piceous to nigro-piceous; under surface of body and legs dark rufous. Luster dull. Not pubescent, punctures minutely setigerous.

Head (Pl. I, fig. 23.) about one-half as wide as the pronotum; sides before the eyes moderately convergent anteriorly, almost straight and not perceptibly reflexed, not emarginate at the oblique sutures; epistoma truncate at apex, angles moderately broadly rounded; frons flat, slightly and rather broadly impressed along the linear frontal suture, eyes somewhat sunken, rather coarsely, extremely densely and confluently punctate throughout, punctures moderately impressed. Outer surface of the mandibles densely punctate, superior and inferior margins sharp and prominent. Genae and tempora densely and evenly punctate. Casey states that the mentum (Pl. II, fig. 17.) is wider than long, trilobed at apex; the surface deeply biimpressed, the two foveae separated by a strong thick and tumid carina which becomes less prominent toward base. Antennae (Pl. II, fig. 9, and Pl. IV, fig. 6.) not quite as long as the head and pronotum, moderately robust, strongly compressed and incrassate apically; second joint about as long as wide, third twice as long as the second and as wide as the fourth and fifth, fourth a little longer than either of the three following; eighth, ninth and tenth equal in length, last four joints gradually increasing in width, ninth and tenth a little more than a half wider than long, eleventh slightly irregularly rounded and as long as wide.

Pronotum (Pl. I, fig. 18.) about one-third wider than long; apex but slightly narrower than the base, subtruncate, apical angles narrowly rounded and slightly prominent anteriorly; sides scarcely strongly and evenly arcuate, hardly sinuate for a short distance before the basal angles which are obtusangular, not rounded nor prominent; disk feebly convex, slightly and narrowly impressed laterally along the marginal bead, the latter very finely reflexed, somewhat coarsely, very deeply and densely punctate, the punctures very distinctly longitudinally coalescent throughout (Pl. I, fig. 10.), rather less so in the central area, the intervals mere elevated reticulately anastomosing convex lines. Propleurae longitudinally rugose, moderately concave beneath the explanate lateral pronotal margins, the immediate under surface of the margins smooth and not rugose; punctures small, inconspicuous and located on the upper surface of the rugae, each with a short and fine seta. Prosternum densely rugoso-punctate, each puncture with a short seta; intercoxal process arcuate and partly margined.

Elytra scarcely more than twice as long as the prothorax and just visibly wider; nine costate, costae less developed in the central area, thence more gradually elevated and the intervals correspondingly deeper, especially on the declivous sides and not atrophic on the apical declivity, the second, fourth and sixth nearly attain the basal margin; carinae narrow, carinal punctures very widely spaced and more or less variable in size; paracarinal punctures small (Pl. I, fig. 9.), separated by a distance equal to two or three times their diameter and located against the carinal margins which they slightly crenulate, a few similar punctures are to be observed scattered here and there on the intervals and probably are vestigial in character of the parastrial series observed *grossa* Lec. Strial punctures moderate in size, slightly elongate and evanescently impressed on their posterior margins as seen by oblique illumination, separated by a distance equal to two or three times their diameter. The seventh costa of each elytron attains the humeri without being joined by the ninth, apically the first three costae on each are parallel and quite entire on the declivity. Epipleurae rather densely punctate, punctures not sharply defined; base subacutely margined beneath the subdentiform humeri. Parapleurae coarsely and closely punctate, punctures round and shallow. Meso- and metasternum densely rugoso-punctate.

Abdomen densely, very coarsely and deeply punctate, each puncture with a rather long seta. Profemora moderately inflated. Second and third joints of the metatarsi are equal in length (Pl. III, fig. 9.); the fourth is three times as long as the second.

The sexes are similarly robust and the abdomen is impressed on the middle third of the first three segments, the impression is a little deeper on the second segment in the male.

Measurements: (Types) Length, 7.0 to 7.8 mm.; width, 3.1 to 3.3 mm.

*Holotype* and one *paratype* in the Casey collection, United States National Museum, Washington, D. C. Sex not determined.

*Type locality.*—Southern California, (Casey).

The author during a visit at the National Museum in 1928 had an opportunity to study the types of *crassicornis* Casey. Four specimens are associated in the Casey series. The first two (types) are without a question different from the second two. The latter agree with a specimen kindly given to the author by Col. Casey and labeled *crassicornis* in his own hand writing, it was collected on Santa Catalina Island. Examination with an ordinary hand lens showed very distinctly that the specimen is pubescent, the hairs being more or less broken off and stubby; therefore the elytra are not glabrous as stated in the description of *crassicornis* and, very evidently a specimen of *pubescens* Lec. It should be very clear to every one how a wrong impression was gained and expressed in the Entomological News of March,1925, p. 25.

Casey states that *crassicornis* differs from *rufipes* in its antennal structure, larger size and more robust, depressed form, more transverse prothorax and much more conspicuous abdominal setae. It is the largest species of the Rufipes Group. The species has been a source of speculation ever since the appearance of the description. Various specimens of *laticornis* Casey have been referred to it. In the Horn material (Coll. Amer. Ent. Soc. of Phila.), four specimens associated with small specimens of *pubescens* have been recognized as Casey's *crassicornis;* they carry simply a State label and are registered as "Horn coll.—H 7374," with them were two specimens of a species which Casey described as *montanus* in 1924, these have been discussed under *rufipes* Esch.

*Pubescens* Lec. belongs to a different group of species entirely, in which the lateral margins of the pronotum are not explanate, but flush with the plane of the propleural surface, besides having the elytra conspicuously pubescent. The largest specimen in the Horn series of *crassicornis* measures: Length, 7.5 mm.; width, 2.5 mm.

In the series of Eulabes very kindly loaned to me for study by Mr. Chas. Liebeck of Philadelphia, were nine specimens of *crassicornis*. With three exceptions they all bear simply a "Cal." label. One specimen has a "Fort Tejon, Cal." label. Regarding the authenticity of this label, Mr. Liebeck writes: "I can vouch for this Fort Tejon specimen, as it is a Crotch specimen and I strongly suspect that all the material of this one species—seven specimens with a "Cal." label—is from the same source and collector, though Dr. Horn may have taken it also at Fort Tejon (four specimens), as I believe he collected there during the civil war." The Crotch specimen is important as it establishes a definite habitat.

Mr. Liebeck further writes: "In the Crotch Key of his collecting localities in California during the early seventies, 'd' indicates Gilroy; 'e' Fort Tejon and 'f' Santa Barbara; from his alphabetical sequences one can almost follow his entire trip."

Two of Mr. Liebeck's specimens have "Los Angeles" labels. Concerning these he informs me: "As one of Crotch's letters equals Los Angeles, it is possible the above two specimens may even have been blank cards but so placed that one would suppose from their proximity to be Los Angeles lettered cards that they were all from the same locality. Under the circumstances I think it would be wise to express a doubt about the Los Angeles Label, but by all means accept the Fort Tejon locality. This does not explain the origin of Casey's specimens." Mr. Liebeck very generously permitted the author to retain four specimens which are now in the Museum of the California Academy of Sciences, San Francisco.

The genital characters of *crassicornis* have not been studied, but are without the least doubt of the *rufipes* type.

### EPANTIUS LeConte

1851. *Epantius* LeConte, Ann. Lyc. N. Y., v, Sept. 15, p. 144.

1859. *Epantius* Lacordaire, Hist. Nat. d. Ins., Gen. des Col., v, p. 134.

1861. *Epantius* LeConte and Horn, Smiths. Misc. Coll., III, p. 228. (Class. Col. Am. N. Mex., Pt. 1).

1870. *Epantius* Horn, Proc. Am. Philos. Soc., XIV, p. 324. (Revis. Tenebr.).

1891. *Epantius* Casey, Ann. N. Y. Acad. Sci., VI, p. 60, Nov. (Col. Not., III).

Body depressed. Elytra declivous and not margined at base, devoid of costae, except laterally where the outer three or four are feebly evident; scutellum distinct, transverse and not entering between the elytra. Eyes (Pl. I, fig. 12.) larger than in either *Eulabis* or *Apsena*. Antennae slender (Pl. II, fig. 3.), third joint moderately elongate, outer four joints slightly transverse. Mentum differing in the sexes, middle lobe atrophic, lateral lobes fully exposed. Metasternal epimera (Pl. V, fig. 12.) smooth and impunctate. Third and fourth abdominal sutures not deeply impressed. Tarsi (Pl. III, figs. 1A, 1B and 1C.) moderately slender and elongate. Maxillary palpus (Pl. V, fig. 10.) with the terminal joint less elongate dorsally and therefore shorter and less oblique apically.

GENOTYPE: *Epantius obscurus* LeConte.

The several generic characters are sufficiently distinctive to give *Epantius* full generic standing. Its habitat is strictly littoral, not terraneous nor myrmecophilous as in other Eulabes.

**Epantius obscurus** LeConte

1851. *Epantius obscurus* LeConte, Ann. Lyc., N. Y., v, p. 144, Sept. 15.

1859. *Epantius obscurus* Lacordaire, Hist. Nat. d. Ins., Gen. des Col., v, p. 134.

1861. *Epantius obscurus* LeConte and Horn, Smiths. Mis. Coll., III, p. 228, May. (Class. Col. Am. N. Mex., Pt. 1).

1870. *Eulabis obscura* Horn, Proc. Am. Philos. Soc., XIV, p. 324. (Revis. Tenebr.).

1891. *Eulabis obscura* Casey, Ann. N. Y. Acad. Sci., VI, p. 59, Nov. (Col. Not., III).

Form depressed oblong-oval, very feebly narrowed anteriorly, a little more than twice as long as wide. Color piceous, to paler from immaturity, black when fully pigmented; antennae, trophi and legs more or less ferruginous, under surface variably so. Luster dull and somewhat alutaceous, somewhat shining beneath. Pubescence fine, soft, pale and very inconspicuous, more or less erect, best developed at the sides and on apical declivity of the elytra; longer and flying on the prosternum, similar but shorter on the mesosternum, recumbent on the abdomen.

Head relatively small, about as wide as long, widest across the anterior canthi, the latter as prominent as the eyes; sides moderately convergent anteriorly to the rather broadly rounded epistomal angles, slightly and broadly sinuate over the antennal insertions, otherwise somewhat straight, not reflexed nor notched at the oblique sutures, epistomal apex truncate; frons and epistoma feebly convex, moderately widely and slightly impressed along the frontal suture, densely and rather coarsely punctate, punctures not strongly defined and shallow, most so on the epistoma, setae minute. Eyes (Pl. I, fig. 12.) quite large, convex and slightly prominent, moderately sinuate at the anterior canthi. Mentum (Pl. III, figs. 7 and 8.) slightly transverse and trapezoidal in outline; apex feebly emarginato-truncate, middle lobe atrophic, differing in the sexes, lateral lobes broadly exposed; carinate on the median line, surface not strongly sculptured. Antennae (Pl. II, fig. 3.) rather short and slender, not attaining the pronotal base, very feebly incrassate, slightly compressed in outer joints; second joint as long as wide, cylindrical, third one and a half times longer than the second, four to six subequal in width, fourth longer than wide and two-thirds as long as the third, fifth and sixth about as long as wide, seventh slightly longer than the sixth; eighth, ninth and tenth equal in length, slightly wider than long, eleventh rounded short oval, as long as the third. Tempora feebly convex; gular surface sparsely punctate.

Pronotum (Pl. I, fig. 22.) about a third wider than long; apex arcuato-truncate, slightly sinuate opposite to the eyes, angles obtusely rounded, not prominent anteriorly; sides broadly and moderately arcuate, slightly convergent anteriorly, feebly sinuate in basal two-eighths, straight and parallel in basal eighth; base broadly arcuate in middle three-fifths, broadly sinuate laterally, angles rectangular; disk feebly and quite evenly convex, slightly declivous at the apical angles, least convex laterally in the submarginal area, feebly impressed in vicinity of the basal angles; densely and somewhat coarsely punctate, punctures separated by a distance equal to their diameter or less, largely discrete but showing evidence of coalescing longitudinally in twos and threes laterally; lateral bead fine, feebly reflexed; setae minute.

Propleurae not strongly longitudinally rugose, rugae more or less fragmented forming elongate tubercles which have the small and inconspicuous punctures and setae on their upper surface; along the marginal bead the surface is almost smooth; the pronotal margin is scarcely more prominent than the plane of the propleural surface. Prosternal punctures obsoletely defined, surface feebly subasperate.

Elytra slightly wider than the prothorax, about two-thirds longer than wide; sides broadly arcuate, apex moderately broadly rounded; base transverse, not margined and declivous, a little wider than the pronotal base, humeri small, angulate and subacute, feebly prominent; disk feebly convex in the central area, moderately strongly and arcuately deflexed at the sides, gradually and arcuately declivous apically; costae obsolete (Pl. I, fig. 3.), feebly indicated laterally and on the apical declivity and more or less interrupted, strial punctures elongate linear impressions, varying in length and separated rather unequally by a distance equal to one or two times their length; interstrial surface irregularly punctate, punctures small, the series of other Eulabes not clearly discernible, irregularly spaced, each with a minute pale seta, except laterally and apically where the setae are fine, longer and quite erect.

Epipleurae arcuately rounded and not margined at base, feebly uncinate at the humeri; surface finely, sparsely and more or less subobsoletely punctate; superior margin a fine rised line which becomes more or less obsolete in apical third.

Parapleurae coarsely and densely punctate, punctures not sharply defined and more or less coalescent. Meso- and metasternal sculpturing similar to that of the prosternum. Metasternal epimera smooth and impunctate (Pl V, fig. 12.).

Abdomen smooth and more or less shining, not densely punctate, punctures moderately small, rather irregularly spaced, separated by a distance equal to three or four times their diameter, a little larger laterally, smaller on the fifth segment.

Legs (Pl. III, figs. 1A, 1B, and 1C.) moderate in length, rather slender, femora finely and rather sparsely punctate, gradually widened toward apex; profemora moderately inflated; protibiae slightly arcuate; meso- and metatibiae straight, tarsi slender and elongate.

Male. Mentum (Pl. III, fig. 7.) truncate at apex; surface scarcely impressed lateral to the broad and tuberculate carina, tubercle oval and truncate at apex, feebly elevated. Abdomen more definitely impressed on the first and second segments at middle.

Female. Mentum (Pl. III, fig. 8.) carinate, carina narrow and straight, surface broadly impressed each side of the carina; abdomen scarcely impressed at middle of first three segments.

Measurements: Length, 7 to 8 mm.; width, 2.4 to 3 mm.

*Type Locality.*—San Diego, California, (LeConte).

*Type* located in the LeConte collection, Entomological Department, Harvard University, Cambridge, Massachusetts.

*Distribution.*—California sea beaches and those of the islands off the coast of southern California, from Lower California northward to Tomales Bay, Marin County, California. They are found at and above high water mark under kelp and sea grass.

San Diego County—Bay shore, August 7, 1907, (Blaisdell); Coronado Beach, (J. I. Carlson, Geo. Field, Blaisdell); Point Loma, December 28, 1928, (Van Dyke). Los Angeles County—Naples near Long Beach, April 7, 1918. San Mateo County—Moss Beach, July 7, 1912, (Van Dyke, Blaisdell). Monterey County—Carmel, March 17, 1929, (Louis S. Slevin). Marin County—Inverness on the shore of Tomales Bay, August 14, 1910, (Van Dyke and Blaisdell). Santa Barbara, March 2, 1921, and Point Conception, June 10, 1924 (Warwick Benedict). Alameda County—Shore of San Francisco Bay, (Coll. Chas. Liebeck). San Nicolas Island, November 7–12, 1911, and Santa Cruz Island, April 13, 1913, (J. R. Slevin).

An easily recognized species by its habitat, depressed form, tuberculated mentum of the male, absence of elytral costae, elongated punctures, larger eyes and elongate tarsi.

*Genital Characters.*—Male. Edeagophore (Pl. VI, figs. 12A, 12B, and 12C.) rather short, somewhat robust and flax-seed-shaped; basale noticeably wider than the apicale, and strongly arcuate in basal fourth. Apicale triangular, about twice as long as wide, sides quite straight and converging to apex, the latter obtuse, feebly emarginate at the dorsal and ventral grooves; dorsum quite plane, base rather feebly arcuate at middle and sinuate laterally; ventral surface convex at and opposite base of the genital fissure, impressed apically, inflexed plates or alae broad and rounded separately at apices between the inflexed sides of the basale; genital fissure subfusiform, intromittent organ narrow and cylindrical, occupying the fissure. Basale about twice as long as wide, moderately depressed, sides broadly arcuate, inflexed sides rather broad, membranous interval equal in width to about one-third of the ventral surface.

Female. Genital segment (Pl. VI, fig. 10.) rather short, triangular in full adduction of the valves. Dorsal plate or sclerite oblong, scarcely narrowed apically, inner margin quite straight, surface scarcely impressed, very sparsely punctulate, each punctule with a short erect hair; true apex small and membranous internal to the well defined stylifer, which is rounded at apex and not incurved as in *Apsena rufipes* Esch., surface with few piliferous punctules. Appendages rather short and mammilliform, about a half longer than wide, with two or three long tactile hairs at apex. Ventral surface (Pl. VI, fig. 11.) as a whole convex, that of each valve divided by two sutures into three sclerites; basal sclerite transversely oblong, in full adduction of the valves in contact with its fellow of the opposite side, somewhat obliquely directed inward and basad; inner margin of middle and apical sclerites conjointly broadly and rather arcuately sinuate, sparsely punctulate and piliferous as on the dorsal surface; apical sclerite similar to apical part of the dorsal plate. Pudendal membranes finely longitudinally rugulose.

## COMMENTS

The study of the primary sexual characters constitutes a special line of research; it requires dissection and much tedious work to properly present the essential details of structure, body form and sculpturing, so that differentiation and correlation can be satisfactorily accomplished. The aedeagi of the different major coleopterous families present very different types of structure and problems, consequently each must be studied critically on their own merits, e.g., Carabidae, Scarabaeidae, Tenebrionodae and Rhyncophora.

The morphological studies of Tanner[9] and Wilson[10] and others pave the way; the observations have been made only from cleared specimens that do not reveal, individualize nor accentuate the essential details of surface form. It is like studying the osseous skeleton of a vertebrate animal, which suggests but does not materialize the body surface characteristics. The treatment of the aedeagi of the Alleculidae in the Biologia Centrali Americana is much better. The same treatment should be given to the aedeagi as when drawing up the description of a new species from the external characters. The minor details of surface form and sculpturing appertain to species and are not as important as the major details which are of phyllogenetic significance.

To theorize or argue from insufficient data concerning phyllogenetic relationships of coleopterous groups, I consider immature and a waste of time. Personally I can only speak regarding the Tenebrionidae. The facts gleaned thus far and the possibilities that are indicated appear most encouraging. No one pretends to advance the idea that such studies are of practical use in the identification of species and for that reason are ignored by practical taxonomists, nevertheless such investigations are absolutely necessary for the elucidation of relationships and phyllogeny.

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[9] Genetalia of the Female Coleoptera. Trans. Am. Ent. Soc., LIII, 1927, pp. 5–50.

[10] The Genetalia and Wing Venation of the Cucujidae and related Families. Ann. Ent. Soc. Am., XXIII, 1930, pp. 305–358.

In my Monograph of the Eleodiini,[11] I demonstrated beyond all argument the value of the study of the primary genital characters. Students entering upon the study with preconceived ideas is most apt to be influenced by them in making final deductions; an open mind with complete submersion of the personal equation is necessary, the observed facts must dictate the final decisions. This applies to all other lines of research as well.

In the present study are presented facts as they are revealed by the microscope. Compare and follow my remarks given below and synopses given on pages 43, 50 and 51, regarding the following: Plate VI, figures 1 and 2, 4 and 5, 10 and 11; plate III, figures 4 and 5, illustrating the three types of genital structure, presented by the females of the Eulabes. Compare the genital segment of *Eulabis bicarinata* with that of *Epantius obscurus*, and with that of *Apsena pubescens*, as well as that of *Apsena rufipes*, and note that the general form of the segment of *Eulabis bicarinata* is quite different from that of the others mentioned, that it resembles the same, with the exception of *pubescens* and related species, in having the appendages arise from well defined stylifers (Pl. VI, figs. 1B and 2A.). The genital characters of *Eulabis bicarinata* correlated with the external characters and habitus, isolates that species and renders the generic separation valid. It is evident that *Epantius obscurus* is more closely related to *Apsena rufipes* than to *Eulabis bicarinata*. A correlation of the characters as before renders its generic separation likewise valid.

The genital segment of *Apsena pubescens* compared with that of *rufipes* shows that the characters presented by the apices of the dorsal plates of the valves indicate two distinct groups: the Pubescens Group and the Rufipes group, for the members of the two groups have a common generic habitus. If *Apsena grossa* now be introduced it can be observed by Plate V, figures 1 and 2, that *grossa* differs markedly from both *pubescens* and *rufipes*, in the characters of the dorsal plates and apices, indicating a third group, i.e., the Grossa Group. If the reader will now consult the synoptic tables, it can be noted that the genital characters are distinctive and correlated, in each instance with the external characters that are used for the definition of groups.

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[11] Bull. 63, U. S. Nat. Mus., (1909).

Without introducing details or prolonging the discussion beyond calling students' attention to actual facts, I have only indicated the salient relationships. Our knowledge at present is too meager for generalization, which should not be attempted until the tribes have all been studied, at the present time I refer only to the Tenebrionidae.

For the purpose of emphasizing and urging the comparison of tribal differences I have included figures of *Eleodes* (*Blapylis*) *tuberculata* (Pl. IV, fig. 8C.) and of *Eleodes dentipes* (Pl. IV, fig. 15A.), each showing the presence of clavae, structures not present in the Eulabes. On the other hand the Eulabes present divisions (Pl. VI, fig. 2B, 2C, and 2D.) of the ventral plates of the valves by sutures not present in the Eleodiini.

The salient tribal and generic characters are divergent and have their origin in species of earlier geologic times. *Eulabis bicarinata* Esch. and *Epantius obscurus* Lec. are fixed types and the large series studied from different areas of their habitat show no variation, except in size. While *Apsena* includes plastic forms that are evolving new species. *Apsena grossa* Lec. is unique and insular in habitat, shows no variation except in size. I believe that intensive collecting on the islands off the Californian coast should result in the discovery of other specific forms allied to *grossa*.

The following list of the Eulabes give the species as nearly as possible in the order of their genital relationship:

*Eulabis bicarinata* Esch.
*Epantius obscurus* Lec.
*Apsena rufipes* Esch.
    var. *opaca* n. var.
    *simplex* n. subspecies
    *crassicornis* Casey.
*Apsena pubescens* Lec.
    *rufescens* n. subsp.
    *insularis* n. sp.
    *barbarae* n. sp.
    *laticornis* Casey.
    var. *subvestita* n. var.
    *leachi* n. sp.
*Apsena grossa* Lec.

## EXPLANATION OF PLATES

### PLATE I

Fig. 1. Diagrammatic camera lucida drawing showing the elytral sculpturing of *Apsena grossa* Lec.; A, sutural margin and apicad.

Fig. 2. Ditto of *Apsena insularis* new species; A, sutural margin and apicad.

Fig. 3. Ditto of *Epantius obscurus* Lec.; A, sutural margin and apicad.

Fig. 4. Ditto of *Apsena pubescens* Lec.; A, sutural margin and apicad.

Fig. 5. Ditto of *Apsena laticornis* Casey; A, sutural margin and apicad.

Fig. 6 Ditto of *Apsena leachi* new species; A, sutural margin and apicad.

Fig. 7. Ditto of *Eulabis bicarinata* Esch.; A, sutural margin and apicad

Fig. 8. Ditto of *Apsena rufipes* Esch.; A, sutural margin and apicad.

Fig. 9. Ditto of *Apsena crassicornis* Casey; A, sutural margin and apicad.

Fig. 10. Camera lucida tracing of the pronotal sculpturing of Apsena crassicornis made from the paratype; A, central area; B, lateral area; C, submarginal area; D, marginal area

Fig. 11. Right maxillary palpus of *Eulabis bicarinata*, male; joints two, three and four.

Fig. 12. Camera lucida outline of left eye of *Epantius obscurus.*

Fig. 13. Ditto of *Apsena pubescens.*

Fig. 14. Ditto of *Apsena insularis*, new species.

Fig. 15. Right maxillary palpus of *Apsena grossa;* joints two, three and four

Fig. 16. Camera lucida outline of the pronotum of *Apsena rufipes*, female

Fig. 17. Ditto of the head of *Eulabis bicarinata*, female.

Fig. 18. Ditto of the pronotum of *Apsena crassicornis* (Paratype, Casey collection.).

Fig. 19. Camera lucida outline of left eye of *Eulabis bicarinata.*

Fig. 20. Ditto of the pronotum of *Eulabis bicarinata*, male.

Fig. 21. Ditto of the pronotum of *Apsena pubescens*, male.

Fig. 22. Ditto of the pronotum of *Epantius obscurus*, female.

Fig. 23. Ditto of the head of *Apsena crassicornis*, slightly higher magnification.

### PLATE II

Fig. 1. Antenna of *Apsena grossa*, female.

Fig. 2. Antenna of *Apsena grossa*, male.

Fig. 3. Antenna of *Epantius obscurus*, female.

Fig. 4. Antenna of *Apsena pubescens*, male.

Fig. 5. Antenna of *Apsena leachi*, female.

Fig. 6. Antenna of *Eulabis bicarinata*, male.

Fig. 7. Antenna of *Apsena insularis* new species, female.

Fig. 8. Antenna of *Apsena laticornis*, male.

Fig. 9. Antenna of *Apsena crassicornis*, paratype.

Fig. 10. Antenna of *Apsena rufipes*, male.

Fig. 11. Antenna of *Apsena simples* new species, male.

Fig. 12. Antenna of *Apsena montana*, male.

Fig. 13. Mentum of *Apsena grossa*, male.

Fig. 14. Mentum of *Eulabis bicarinata*, male.

Fig. 15. Mentum of *Eulabis bicarinata*, lateral view, male.

Fig. 16. Mentum of *Eulabis bicarinata*, female.

Fig. 17. Mentum of *Apsena crassicornis*, paratype.

## Plate III

Fig. 1. Left legs of *Epantius obscurus*, female: A, anterior; B, middle; C, posterior.

Fig. 2. Left legs of *Apsena rufipes*, male: A, anterior; B, middle; C, posterior.

Fig. 3. Left legs of *Eulabis bicarinata*, male: A, anterior; B, middle; C, posterior

Fig. 4. Aedeagus of *Apsena rufipes*, female, dorsal view.

Fig. 5. Aedaegus of *Apsena rufipes*, female, ventral view.

Fig. 6. Aedeagus of *Apsena rufipes*, male: A, dorsal view; B, ventral view; C, lateral view.

Fig. 7 Mentum of *Epantius obscurus*, male.

Fig. 8. Mentum of *Epantius obscurus*, female.

Fig. 9. Posterior tarsus of *Apsena crassicornis*, paratype

Fig. 10. Posterior tarsus of *Apsena insularis*, new species.

## Plate IV

Fig 1. Legs of *Apsena grossa*, female: A, anterior; B, middle; C, posterior.

Fig. 2. Legs of *Apsena pubescens*, male. A, anterior; B, middle; C, posterior.

Fig. 3. Camera lucida tracing of the humeral region of *Apsena rufipes*, showing the uncinate base of an epipleura and the dentiform humeral angle.

Fig. 4. Left mandible of *Apsena montanus*, male: inferior surface showing the basal molar (A), subapical tooth on the upper and inner edge and bicuspid apex.

Fig. 5. Left mandible of *Apsena montanus*, showing inner surface, with molar and fleshy lobe.

Fig. 6. Left antenna of a specimen of *Apsena crassicornis* in the Horn collection.

Fig. 7. A diagrammatic drawing of a lateral ventral surface of the aedeagi of the male (left), and female (right) to illustrate the homology; F and E, valvifer (Tanner); G and D, basal sclerite; H and C, middle sclerite; I and B, apical sclerite; A, stylifer with appendage (stylus of Tanner). The female is represented by a valve (coxite of Tanner) of *Eulabis bicarinata;* the male by a lateral half of the edeagophore of the male of *Apsena grossa.*

Fig. 8. Aedeagus of *Eleodes* (*Blapylis*) *tuberculata* Lec. (subspecies of cordata Esch.): A, basale (valvifer of Tanner); B, apicale (coxite of Tanner); C, clavae (Blaisdell); D, intromittent organ proper. See figure 15.

Fig. 9. Sculpturing of the central area of the pronotum of *Apsena rufipes*, typical form.

Fig. 10. Sculpturing of the central area of the pronotum of *Apsena simplex*, new subspecies, type.

Fig. 11. Meso-intercoxal region of *Epantius obscurus*, showing line of union between the mesosternum and metasternum, length of the latter indicated by tip of intercoxal process of first abdominal segment.

Fig. 12. Intercoxal process of first abdominal of *Epantius obscurus*.

Fig. 13. Mentum of *Apsena pubescens*, male.

Fig. 14. Mentum of *Apsena pubescens*, female.

Fig. 15. Intromittent organ of *Eleodes dentipes* Esch.: A, clavae (Blaisdell) in full abduction; B, basal processes for attachment of ligaments and muscles.

## PLATE V

Fig. 1. Aedeagus of *Apsena grossa*, dorsal view, female.

Fig. 2. Aedeagus of *Apsena grossa*, ventral view, female.

Fig. 3. Aedeagus of *Apsena grossa*, male. A, dorsal view, AW, basale, AV, apicale; 3B, ventral view, BW, inflexed sides of the basale, BX, homologue of the basal sclerite of ventral surface of the female aedeagus (valve); BY, homologue of middle sclerite; BZ, homologue of apical sclerite; 3C, lateral view.

Fig. 4. Aedeagus of *Apsena leachi*, new species, female, dorsal view.

Fig. 5. Aedeagus of *Apsena leachi*, female, ventral view.

Fig. 6. Aedeagus of *Apsena leachi*, male: A, dorsal view; B, ventral view; C, lateral view.

Fig. 7. Aedeagus of *Apsena laticornis*, female, dorsal view.

Fig. 8. Aedeagus of *Apsena laticornis*, female, ventral view.

Fig. 9. Aedeagus of *Apsena laticornis*, male: A, dorsal view; B, lateral view; C, ventral view.

Fig. 10. Maxillary palpus of *Epantius obscurus*.

Fig. 11. Maxillary palpus of *Apsena pubescens*.

Fig. 12. Left metasternal epimeron of *Epantius obscurus*.

Fig. 13. Left metasternal epimeron of *Apsena pubescens*.

Fig. 14. Left metasternal epimeron of *Apsena grossa*.

Fig. 15. Left metasternal epimeron of *Eulabis bicarinata*.

Fig. 16. Cross section of pronotum of *Apsena pubescens*, showing the lateral pronotal margin flush with propleural surface.

Fig. 17. Cross section of pronotum of *Apsena rufipes*, showing lateral pronotal margin projecting beyond the plane of propleural surface.

## PLATE VI

Fig. 1. Aedeagus of *Eulabus bicarinata*, dorsal view, female: A, dorsal plate of the valve (coxite); B, stylifer with appendage (stylus); E and F, tenth tergite or proctiger (Tanner).

Fig. 2. Aedeagus of *Eulabis bicarinata*, ventral view, female. A, stylifer and appendage, B, apical sclerite; C, middle sclerite; D, basal sclerite, E, valifer. See figure 7, plate 4.

Fig. 3. Aedeagus of *Eulabes bicarinata*, male. A, dorsal view; B, ventral view; C, lateral view.

Fig. 4. Aedeagus of *Apsena pubescens*, dorsal view, female.

Fig 5. Aedeagus of *Apsena pubescens*, ventral view, female.

Fig. 6. Aedeagus of *Apsena pubescens*, male: A, dorsal view; B, ventral view, C, lateral view.

Fig. 7. Aedeagus of *Apsena insularis*, new species, dorsal view, female.

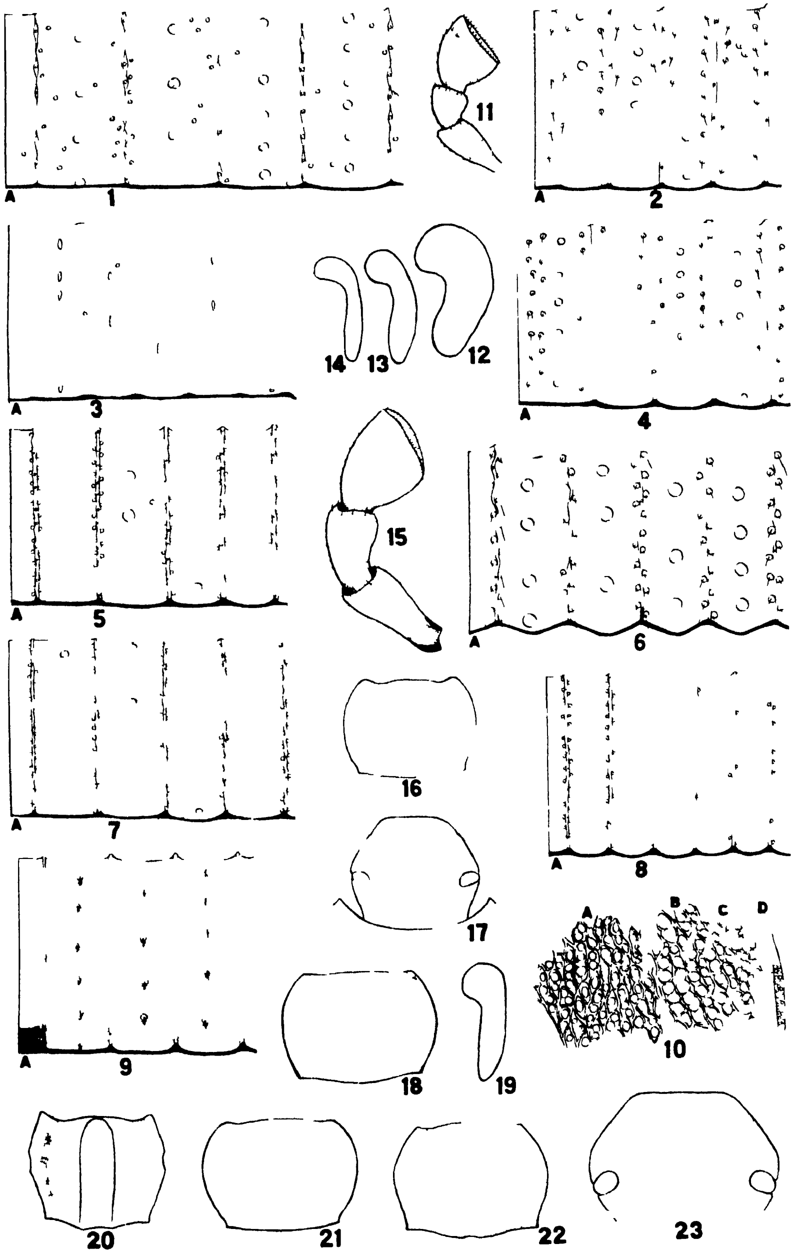
Fig 8. Aedeagus of *Apsena insularis*, ventral view.

Fig. 9. Aedeagus of *Apsena insularis*, male. A, dorsal view, B, ventral view, C, lateral view.

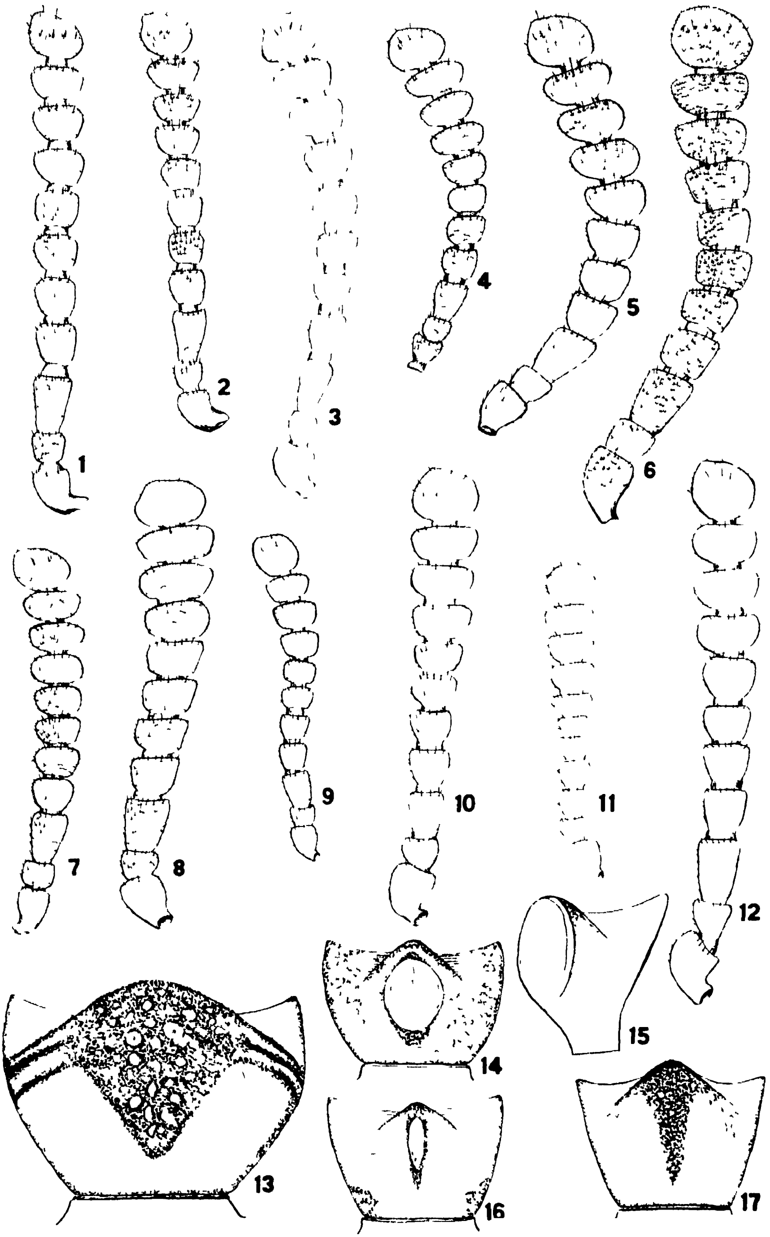
Fig. 10. Aedeagus of *Epantius obscurus*, dorsal view, female.

Fig 11. Aedeagus of *Epantius obscurus*, ventral view, female.

Fig. 12. Aedeagus of *Epantius obscurus*, male. A, dorsal view, B, ventral view, C, lateral view.



BLAISDELL– EULABES



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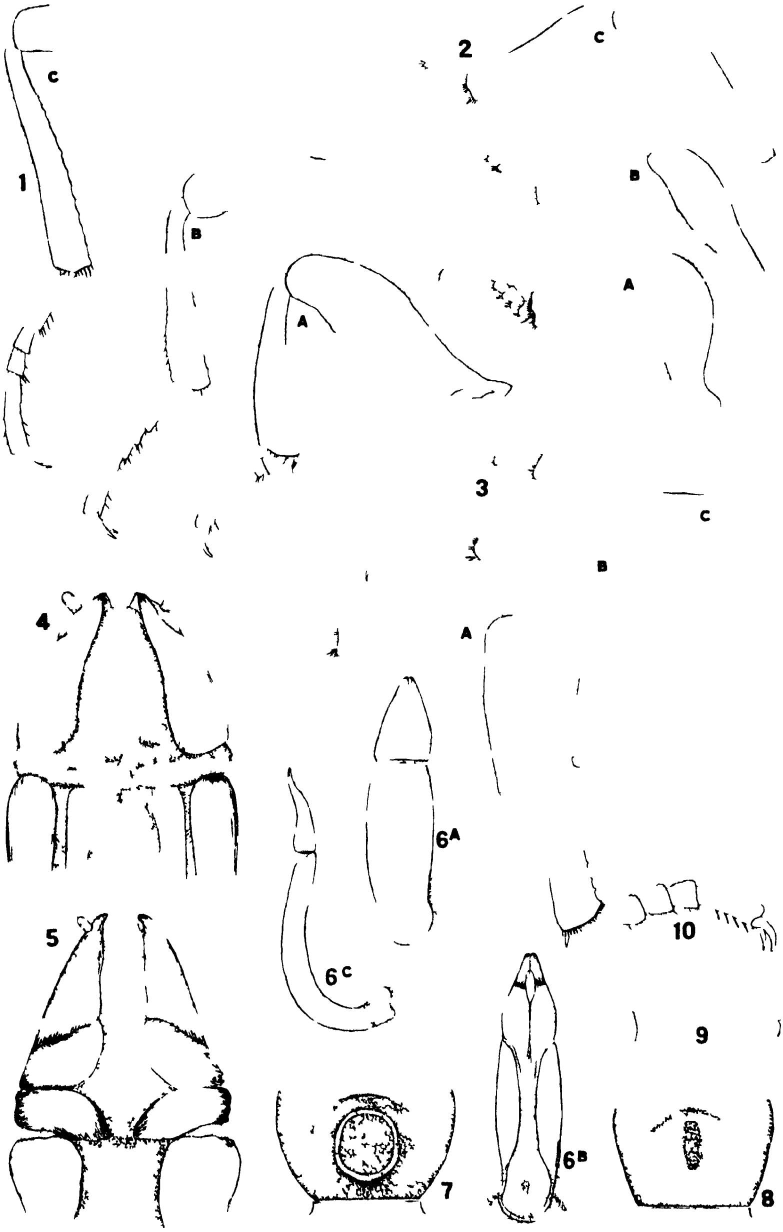

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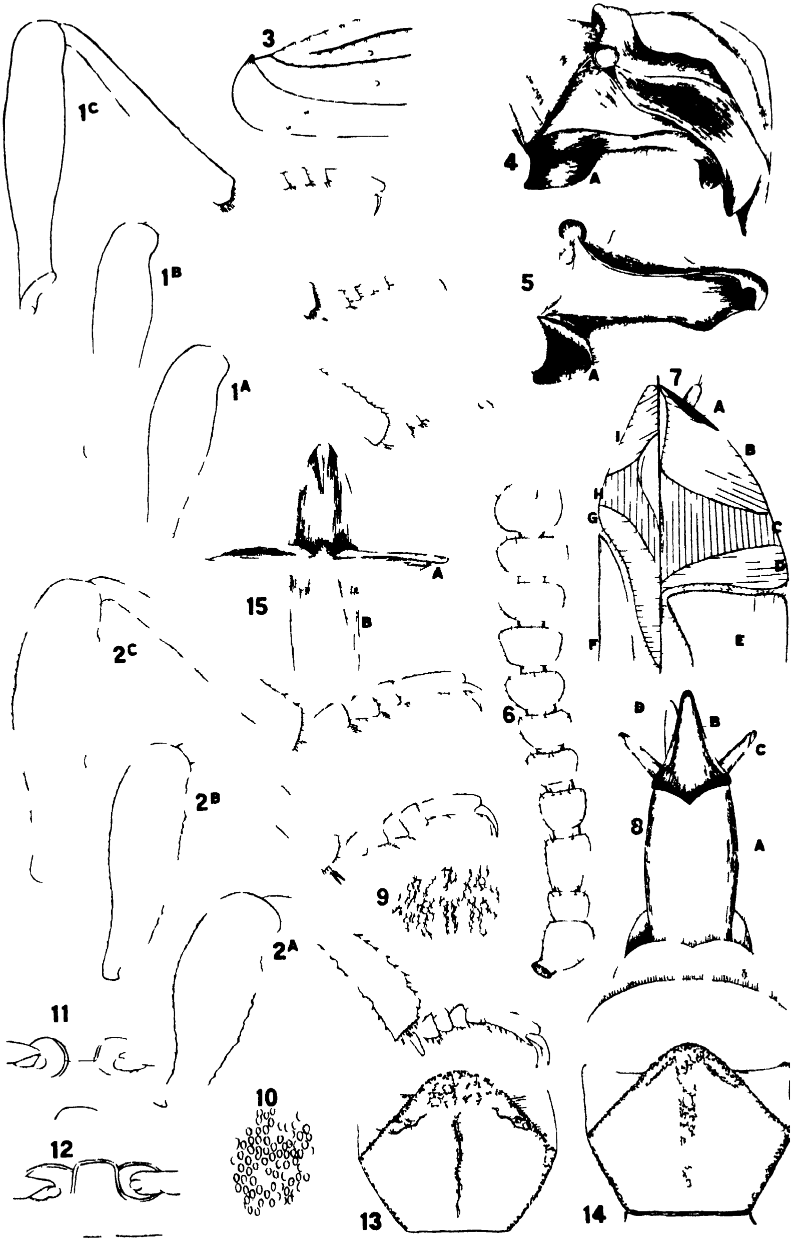

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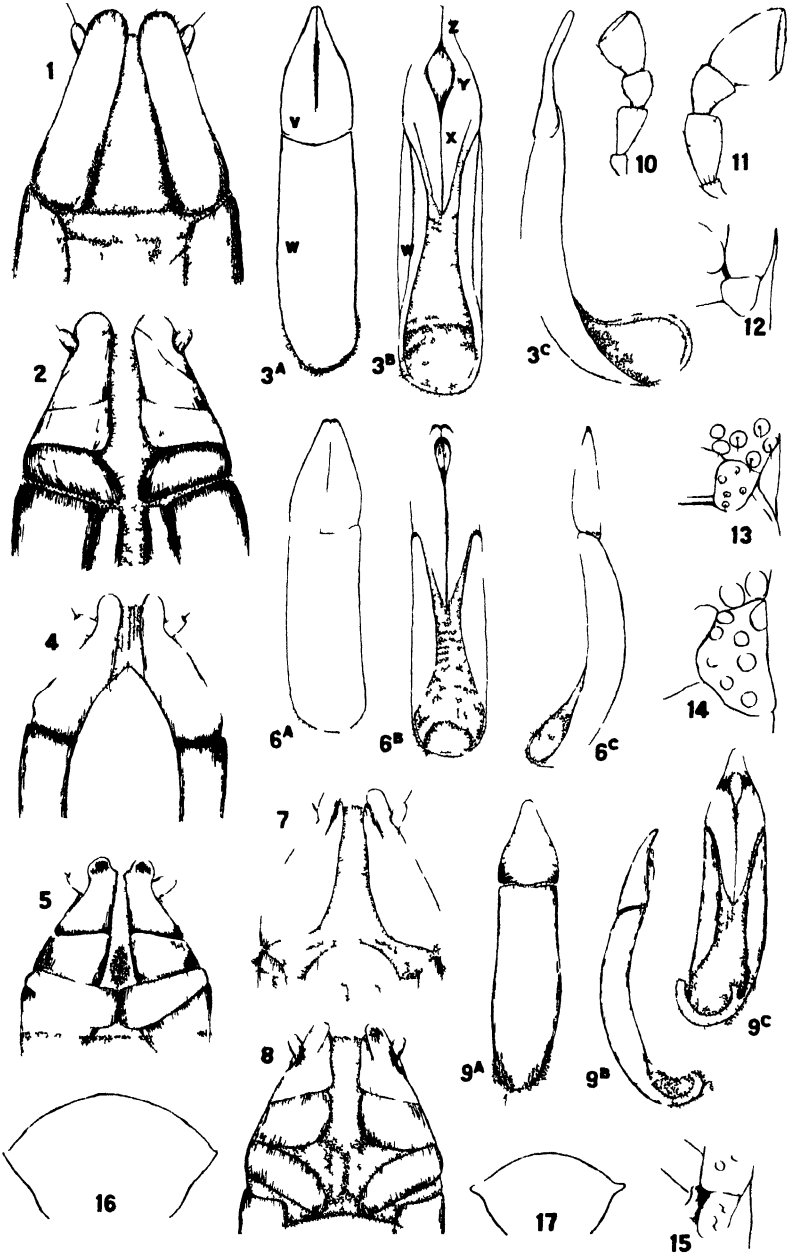

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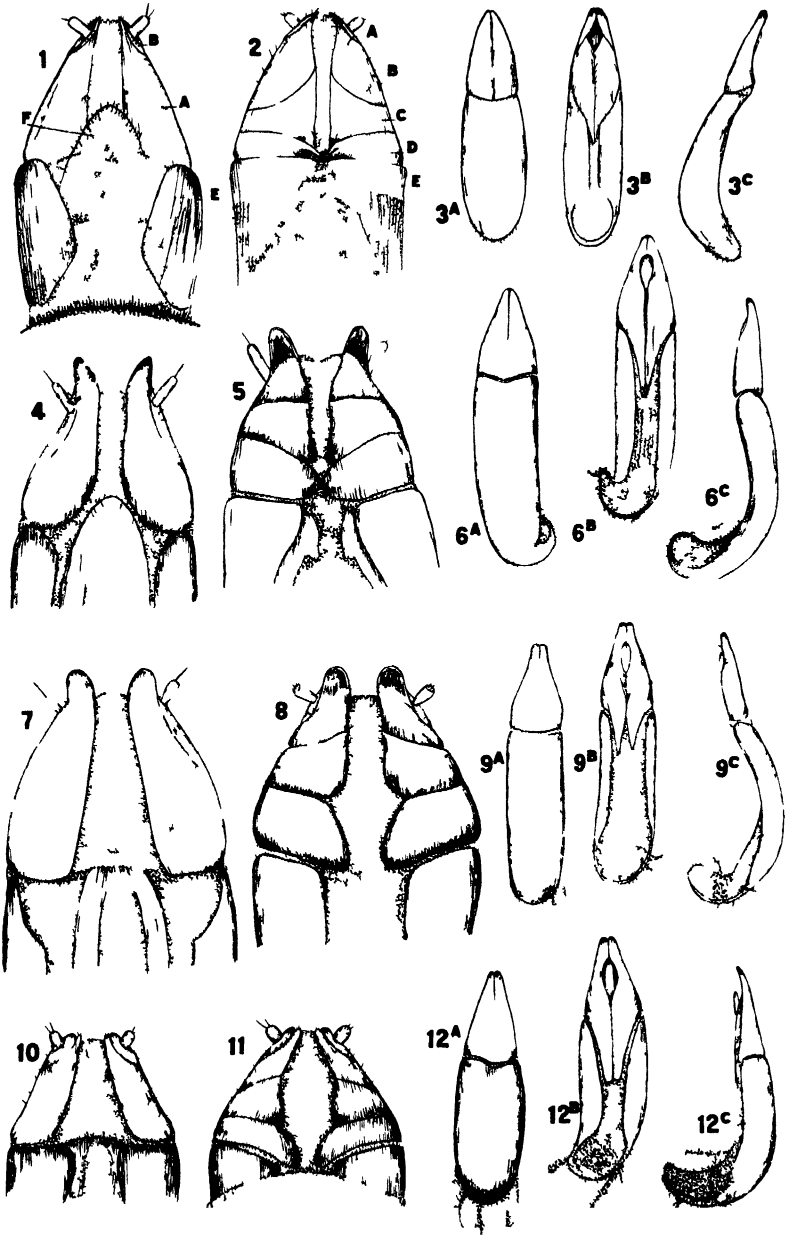

BLAISDELL—EULABES

# NEW OR LITTLE KNOWN NEOTROPICAL BLATTIDAE

## (ORTHOPTERA)

## NUMBER THREE

BY JAMES A. G. REHN

(Plates VII-IX)

The introductory remarks for this series will be found in Number One,[1] to which the student is referred.

The present number contains a revision of the genus *Aglaopteryx* necessitated by information secured through recently received material, and the descriptions of a number of new species of various subfamilies. The species discussed are: (Pseudomopinae) *Aglaopteryx diaphana* (Fabricius), *A. devia* new species, Porto Rico, *A. mira* new species, Cuba, *A. occulta* new species, Bermuda, *A. vegeta* new species, Jamaica, *A. gemma* Hebard, *Eudromiella arara* new species, Amazonian Brazil, *Sciablatta ega* new species, Amazonian Brazil, *Cariblatta advena* new species, Hispaniola; (Panchlorinae) *Lauxoblatta magnifica* new species, Amazonian Brazil; (Corydiinae) *Melestora andeana* new species, Peru; and (Oxyhaloinae) *Chorisoneura yaguas* new species, Amazonian Peru.

### THE SPECIES OF THE GENUS AGLAOPTERYX

The genus *Aglaopteryx* was erected by Hebard in 1917[2] to include the species *A. gemma*, then described, and *Blatta diaphana* Fabricius,[3] of which the former was selected as the genotype.

In 1927 Rehn and Hebard[4] referred to *A. diaphana* material from localities in Cuba, Jamaica, Hispaniola, Porto Rico and Barbados, while previous records of various authors had credited the species to the Bermudas, Bahamas, Culebra Island, Mona Island and St. Thomas.

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[1] Trans. Am. Ent. Soc., LIV, p. 125, (1928). Number Two appeared in the same serial, LVI, pp. 19–71, (1930).

[2] Mem. Am. Ent. Soc., II, p. 30.

[3] Entom. Syst., II, p. 11, (1793). ["Americae meridionalis Insulis."]

[4] Bull. Am. Mus. Nat. Hist., LIV, p. 8.

The acquisition of a very distinct new species from the mountains of eastern Cuba has made necessary a re-examination of all the available material of the genus other than that of *A. gemma.* I now find the male sex shows very definite differences in the structure of the ultimate sternite (subgenital plate) in material from the different islands, and with these are correlated other features of form and pattern in the same sex, and these latter differences are also apparent in the female. It is also evident that two very distinct species occur in Cuba, although one is represented solely by females. The forms which are now found to be represented in the *diaphana* complex are as clearly defined as mainland species in related genera, and no other course is open consistently than to describe these entities as distinct species, where the material is sufficient and the differences decided enough to warrant doing so. The exact status of single females from Camoa, Havana Province, Cuba;[5] Montego Bay, Jamaica;[6] Cayey, Porto Rico,[7] and Easy Hall, Barbados[8] must for the present remain unsettled, as without accompanying males or larger series their proper allocation is hardly possible.

The exact determination of Fabricius' *Blatta diaphana* is difficult. His description is, for the time, rather full, and from it we can at once remove from consideration the new species *occulta* and the previously described *gemma*, the pronotal pattern of both of which is much more complicated than that clearly described by Fabricius. With the remaining forms the problem is much more difficult, as the four others here recognized agree with his description of the pattern, which is all that is covered by his diagnosis. His locality ("Americae meridionalis Insulis"), which clearly means the West Indies, to which the *diaphana* species group is limited, is not definite enough to help in the matter, neither is the source ("Dom. Smidt") of Fabricius' material.

After critically studying and weighing the words of the original description, and in the absence of any existing type, I feel that until demonstrated to be in error the name *diaphana* may be restricted to the lowland form of eastern Cuba, as it has the paired lateral bars of the pronotal pattern more arcuately curved and sinuate and less angulate than in the Jamaican and Porto Rican species. Their direction in the lowland Cuban species is more truly "flexuose," as stated by Fabricius, than in the other species I am recognizing. The large Cuban *mira* is known only from relatively high elevations in the Sierra Maestra, and, although Fabricius gave no size indication, there is little possibility of this species having been in his possession.

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[5] Bull. Am. Mus. Nat. Hist., LIV, p. 8, (1927).

[6] Idem, and Mem. Am. Ent. Soc., II, p. 32, footnote 40, (1917).

[7] Bull. Am. Mus. Nat. Hist., LIV, p. 8, (1927).

[8] Mem. Am. Ent. Soc., II, p. 32, footnote 40, (1917).

It is apparent, when the entire series of the genus is examined, that there is a geographic association of types of pronotal patterns, also of tegminal length. A more detailed examination shows that the structure of the ultimate sternite (subgenital plate) of the male also exhibits distinct differences in the different islands, which is also true of the styles of the same plate. To a lesser degree there is some difference in the proportions of the cerci, robustness of the limbs, and decidedly so in the build and proportions of the caudal tarsi, particularly of the metatarsus. While the other species are of the same general type in palpal proportions, the species from Jamaica (*vegeta*) is distinctive in the short and robust character of the penultimate article.

Linearly I would arrange the species as here treated, starting with *gemma* (Southeastern United States and Bahamas), which has pronounced tegminal and genital differential features, following with *diaphana* (Cuba), *devia* (Porto Rico), *mira* (Cuba), *occulta* (Bermuda) and *vegeta* (Jamaica). The last mentioned species is placed in a final position on account of its palpal proportions and the robust tarsi, which latter are approached in *occulta* and more distantly so in *mira*. The pronotal patterns of *gemma* and *occulta* are distinctive, while those of the other species are of similar general type, with the lateral bars more angulate-sinuate in *devia* and *vegeta* than in *diaphana*.

It would be virtually impossible to present the genitalic differences intelligently in a key, and as these constitute a large part of the diagnostic features of the species I have not attempted a table. The use of the figures here given, however, should make clear the characters which are emphasized as specific features.

**Aglaopteryx gemma** Hebard

1917. *Aglaopteryx gemma* Hebard, Mem. Am. Ent. Soc., II, pp. 18, 32, pl. 1, figs. 9–12. [♂, ♀; Houston and Beaumont, Texas; Lafayette, Louisiana; Hattiesburg, Mississippi; Mobile (type locality), Springhill and Dothan, Alabama; Bainbridge and Floyd's Island, Georgia; Pensacola, River Junction, Ortega, Miami, Long Key and Key West, Florida; Nassau, New Providence Island, Bahamas.]

At this writing I have nothing to add to the published information on this species. I have inserted the original reference to make the present resumé complete in that respect. The figures given by Hebard very clearly present the facies and major characters of the species.

**Aglaopteryx diaphana** (Fabricius) (Pl. VII, figs. 1–5.)

1792. [*Blatta*] *diaphana* Fabricius, Ent. Syst., II, p. 11. ["Americae meridionalis Insulis" (i.e. West Indies).]

CUBA: Camagüey, Camagüey Province. August 15 and 20, 1924. (J. Acuña.) 1♂, 1♀. [A.N.S.P.]

I have given above the reasons for using *diaphana* for the present insect, and it is not necessary to repeat them. If in the future conclusive evidence is brought forward to show that the Fabrician name was based on another species, the present restriction would of course be invalid. In the absence of a type, and in view of the relative character of the sole diagnostic feature (pronotal pattern) given in the original description, I feel the present assignment is warranted and logical.

The male individual from Santiago, Oriente, Cuba, recorded as *diaphana* by Rehn and Hebard in 1927,[9] represents this species, which is thus definitely known only from eastern and east-central Cuba. Whether it is broadly distributed over the island, or is replaced in the western part by another species, remains to be determined.

In *diaphana* as here understood the palpi are relatively elongate, the penultimate article four-fifths as long as the ultimate (as 13 to 16), and regularly and not excessively infundibuliform in shape. The distal tergite of the male abdomen (supra-anal plate) is transversely low trigonal, with the apex broadly rounded and the lateral portions of the margin nearly straight oblique. The cerci are regularly fusiform, moderately attenuate distad, the greatest width of same contained four times in the cercal length (as 12 to 48). Distal sternite of male abdomen (subgenital plate) is not markedly asymmetrical, its distal margin as a whole nearly arcuate, somewhat obliquely flattened and sinuate on dextral side, the surface with a brief longitudinal sulcation mesad of the base of the dextral style. The dextral style is relatively short, mesad in trend, compressed, in profile subspatulate, while its proximal section extends along the sternite's margin for some distance mesad and is subcultriform in character. The sinistral style appears near the median line as a low, rounded, subdeplanate lobe, briefly visible in ventral aspect. On each side of the distal sternite of the male, i.e. dextrad and sinistrad, are placed wing-like extensions of the same, apparently soldered to the dorsal surface of the sternite briefly proximad of the margin; the dextral, which is dextrad of that style, is suberect, low unequally trigonal, narrowing dextrad, with that portion mesad, or next to the dextral style, with its surface sharply bent ventro-caudad and in ventral view giving the appearance of a second style of the trend of the true style, the meso-distal angle moderately acute; sinistral structure low trigonal, less erect than dextral, narrowing sinistrad as seen in ventral aspect, its surface flexuous but not sharply bent as in the other structure, the meso-distal angle moderately acute.

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[9] Bull. Am. Mus. Nat. Hist., LIV, p. 8, (1927).

The distal tergite of the female abdomen (supra-anal plate) is transversely trigonal, lateral portions of the margin subconcave, median emargination prominent U-emarginate, the lateral angles to same narrowly rounded, distal margin of ultimate sternite (subgenital plate) of female regularly low arcuate.

The caudal tarsi are slender, the metatarsus undilated, very slightly longer than remaining articles (as 35 to 32).

The pronotal pattern has the lateral arms as figured, while the median figure is delicate, reverse anchor-shaped when complete (only in Camagüey male), the shaft of same lacking in others. The face has no marked dark pattern, but the occipital interocular dark bar is solid and contrasted in all three specimens.

**Aglaopteryx devia**[10] new species (Pl. VII, figs. 6–7.)

1927. *Aglaopteryx diaphana* Rehn and Hebard, Bull. Am. Mus. Nat. Hist., LIV, p. 7. (In part.) [La Plata, Porto Rico material only.]

Closely related to *A. diaphana*, as here understood, but differing in the more angulately sinuate lateral arms of the pronotal pattern and in the details of the distal abdominal sternite (subgenital plate) of the male, which differs in outline, in the form of the styles and in the absence of lateral wing-like structures of the sternite found in *diaphana*. The unique type of *devia* lacks the caudal tarsi and the cerci are damaged, so these features cannot be compared. The distinct male genital features fully warrant description.

*Type.*—♂; La Plata, Aguadilla, Porto Rico. December 14, 1923. (S. T. Danforth.) [Academy of Natural Sciences of Philadelphia, Type no. 5482.]

Size relatively small; form ovate, tegmina and wings reaching to but not surpassing distal abdominal tergite (supra-anal plate); surface moderately polished.

Head cordiform, greatest width across eyes equal to depth of head, curve of occiput and eye outline regular and unbroken as seen in cephalic aspect; interspace between eyes broad (for sex), three-fifths that between internal margins of antennal scrobes. Palpi with ultimate article but faintly shorter than antepenultimate article (as 15 to 15.5), penultimate article appreciably shorter than either of the others (13); antepenultimate article relatively slender, cylindrical, faintly arcuate; penultimate article distinctly infundibuliform; ultimate article moderately securiform.

Pronotum subtrapezoidal, greatest length contained one and one-half times in greatest width, which is at caudal fourth; cephalic margin subtruncate, rounding laterad into caudad diverging lateral margins, which curving sharply around point of greatest width pass into the arcuato-truncate caudal margin; in transverse section the pronotum is regularly arcuate.

Tegmina subcorneous, short, broad, greatest width (which is mesad) contained two and one-sixth times in greatest tegminal length: costal margin strongly arcuate, apex well but not broadly rounded, sutural margin virtually straight: marginal field broad; scapular field with twelve to thirteen regularly spaced costal veins or rami of the same; discoidal sectors not sharply indicated, six definitely evident, oblique; anal field very large, elongate subpyriform, anal sulcus joining sutural margin slightly distad of middle of tegmen.

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[10] From *devia*—meaning secluded.

Distal abdominal tergite (supra-anal plate) short, strongly transverse, low trigonal, with immediate apex transverse subtruncate. Distal abdominal sternite (subgenital plate) asymmetrical, longer on sinistral side than on dextral, these with oblique, nearly straight, caudad converging margins, the sinistral more extensive than dextral, each passing to distal margin by an obtuse angulation; distal margin on sinistral side transverse truncate to median line, there shallowly indented by end of an oblique depression of distal portion of ventral surface, margin thence subtruncately encircling base of dextral style, and finally cut away dextrad to a brief transverse truncate section extending to lateral obtuse angulation: sinistral style short, broad and subtruncate distad as seen in ventral aspect, in dorsal aspect subexcavate distad; dextral style in ventral aspect shaped like a "boomerang" with concavity mesad and apex narrowly rounded, in dorsal aspect this style is seen to be bifid from near base, and yoke-shaped, the dorsal (or proximal) arm directed mesad, tapering, apically acute spiniform; between the two styles extends distad at least as far as apex of sinistral style a smaller bifid structure, or possibly pair of curved spiniform structures,[11] which is not a part of the internal genitalia but is attached to the dorsal surface of the distal sternite between the stylar bases, the "horns" incurved distad, the dextral longer than the sinistral: apex of genital hook in profile subsigmoid, tapering, acute, styliform, in dorsal aspect with distal section directed caudo-sinistrad. Cerci damaged.

Limbs relatively robust, femora heavy; cephalic femora with ventro-cephalic margin having proximal spines well spaced and somewhat longer than regular series distad of these, but hardly heavier, distal large spines two. Caudal tarsi lacking.

General base color translucent light ochraceous-buff, becoming opaque on the pronotal disk and head. Broad interocular bar on vertex deep prout's brown; eyes prout's brown. Antennae, palpi and limbs of base color. Pronotum with disk outlined laterad and caudad with dark prout's brown as shown in figure (Pl. VII, fig. 6), these margining bars not reaching cephalic margin of pronotum and not enclosing disk cephalad; disk with a few pale brown dots disposed in an angulate line mesad and a spaced pair caudad. Tegmina with humeral trunk heavily lined with dark prout's brown, broadening distad and following suturad on curve of anal sulcus, then changing to a broad diffuse wash extending costad again and covering much of discoidal field, leaving at base of same field costad an arcuate area of the pale base color; mesad and disto-mesad the intercostal sections of the scapular field are finely pencilled obliquely (i.e. parallel to costal veins) with dark colors. Dorsal surface of abdomen solidly dark prout's brown, narrowly bordered laterad with opaque light ochraceous-buff, which borders are more extensive toward apex; ventral surface of abdomen zinc orange, proximad and laterad washed with dark prout's brown, extreme lateral margins bordered as on dorsal surface.

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[11] It is hard to determine, without injury to the unique type, the exact character of this area. Dense membrane makes difficult any more exact statement.

Length of body, 9.3 mm.; length of pronotum, 2.85; greatest width of pronotum, 4.28; length of tegmen, 6.38; greatest width of tegmen, 2.91.

The type is the only specimen I have seen which is referable to *A. devia.*

**Aglaopteryx mira**[12] **new species** (Pl. VII, figs. 8–10.)

This striking and handsome species is far larger than any of the other forms of the genus, with none of which should it be confused, even though it is known only from the female sex. In distribution *mira* may be limited to areas of considerable elevation in eastern Cuba, and possibly even to the Sierra Maestra.

From all its generic relatives the present species can immediately be distinguished by its far greater size (length of body, 12.3–13 mm.). In addition the pronotal pattern will at once distinguish it from *occulta,* the palpal, cercal and tarsal proportions from *vegeta,* and the greater occipital interocular width from *diaphana* and *devia.* The pronotum in *mira* is proportionately narrower cephalad than in most of the other species, with its lateral margins straighter in their obliquity and less arcuate.

*Type.*— ♀ ; Sierra Maestra, Oriente Province, Cuba. Elevation, 900–1200 meters. July 10–21, 1922. (S. C. Bruner and C. H. Ballou.) [Academy of Natural Sciences of Philadelphia, Type no. 5483.]

Size very large (for genus); form as in relatives but alar organs with their tips slightly surpassing apex of abdomen.

Head in outline broad cordiform, greatest depth subequal to width across eyes; interspace between eyes at occiput (cephalad) about four-fifths that between antennal scrobes. Palpi with build and proportions essentially as in *A. devia*, the ratio of ultimate, penultimate and antepenultimate being 20, 19 and 22.5 respectively.

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[12] From *mira*—extraordinary.

Pronotum in outline and form as in *A. devia*, except that cephalad it narrows more decidedly, and the lateral margins are more straight oblique and less arcuate.

Tegmina and wings surpassing apex of abdomen by a distance equal to one-fourth of pronotal length. Tegmina distinctly subcorneous, broader than in *A. devia*, greatest width contained very slightly more than twice in length of same; costal margin more arcuate than in *A. devia*, apex proportionately narrower and more regularly rounded: marginal field broad, relatively short, hardly attaining middle of tegmen; scapular field with fourteen to sixteen costal veins or rami of same, discoidal sectors not sharply evident, six to seven in number, oblique; anal field and sulcus essentially as in *A. devia.*

Distal abdominal tergite (supra-anal plate) trigonal, moderately transverse, tectato-subcucullate, rather narrowly but decidedly quadrate-emarginate at apex. Distal abdominal sternite (subgenital plate) in ventral aspect obtuse-angulate distad. Cerci subfusiform, apical third acuminate.

Limbs of same relative build as in *A. devia.* Cephalic femora with two proximal spines on ventro-cephalic margin distinctly larger and heavier than the more distad continuation of the series. Caudal tarsi slightly more robust than in *A. devia*, faintly deeper; metatarsus to remaining tarsal articles as 57 to 50.

General base color ochraceous-buff, pronotal disk tending toward ochraceous-orange. Head with broad interocular bar russet to mars brown, rather sharply delimited ventrad, fading out dorsad; eyes russet to blackish fuscous. Pronotum with disk margined laterad by relatively broad, sigmoid bars of mummy brown to mars brown, narrowing in cephalic fourth, shaped as in figure (Pl. VII, fig. 8), failing to reach cephalic margin, connected caudad by a broad, similar darkening of the caudal margin between the longitudinal markings; enclosed disk with a few indefinite traces of a sparse lyrate pattern of mars brown. Tegmina with a dark pattern of the same type as in *A. devia*, the portion covering the anal sulcus of the same tone as the pronotal bars, the broad diffusion along the costal margin and over the discoidal field paling to russet. Abdomen with dorsal surface russet to mars brown, narrowly edged laterad with ochraceous-buff; venter of abdomen tawny, darkening to cinnamon-brown toward lateral margins and apex, laterad faintly and incompletely bordered with ochraceous-buff; cerci ochraceous-buff, very narrowly tipped with cinnamon-brown, ventral surface of the articles clouded with the same to a variable degree.

*Measurements (in millimeters)*

| | Length of body | Length of pronotum | Greatest width of pronotum | Length of tegmen | Greatest width of tegmen |
|---|---|---|---|---|---|
| ♀, *type* . | 12.3 | 4.5 | 6.6 | 10.2 | 4.4 |
| ♀, *paratype* | 13 | 4.6 | 6.5 | 10 | 4.7 |

In addition to the type I have before me two paratypic females, taken at the same locality and by the same collectors as the type, one secured between 6060 and 6500 feet elevation on July 10, 1922, while the other bears the same information as the type, with the elevation given as 900–1000 meters. These specimens show no noteworthy differences from the type.

In most cases I would refrain from describing a species from the female sex alone, but the present insect is so distinctive, in size and other features, that I have no hesitation in characterizing it without knowledge of the male sex. It is reasonable to suppose that the latter, when discovered, will possess distinctive genitalic features.

**Aglaopteryx occulta**[13] new species (Pl. VII, figs 11–13.)

1910. *Ceratinoptera diaphana* Rehn, Proc. Acad. Nat. Sci. Phila., 1910, p. 4. (Not *Blatta diaphana* Fabricius.) [Paget West, Bermuda.]

The complicated pronotal pattern of this species is its most readily recognized feature, with which should be associated its small size and stocky form. The occipital interocular space is broad, the limbs are relatively stocky, the caudal tarsi shorter proportionately and heavier than in the preceding species and the distal sternite (subgenital plate) and the styles possess distinctive characters.

*Type.*—♂; Paget West, Bermuda. January 18, 1909. (F. M. Jones.) [Academy of Natural Sciences of Philadelphia, Type no. 5484.]

Size relatively small; form ovate, tegmina and wings falling short of apex of abdomen, leaving three distal tergites of abdomen exposed; surface moderately polished.

Head with outline cordiform, greatest width across eyes equal to depth; interspace between eyes broad (for sex), compared with that between internal margins of antennal scrobes as 17 to 23. Palpi with ultimate article slightly longer than penultimate (as 27 to 25), penultimate and antepenultimate subequal in length; antepenultimate straight, cylindrical, penultimate distinctly infundibuliform, ultimate article moderately securiform.

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[13] From *occulta*—concealed, in allusion to the extent of the pattern.

Pronotum of same type as found in *A. devia* but slightly less transverse, greatest length contained but one and one-third times in greatest width.

Tegmina subcorneous and suggesting those of *A. devia;* greatest width mesad and contained one and one-tenth times in greatest length of same: costal margin in distal half more oblique arcuate than in *A. devia,* appreciably though not decidedly differentiated from the proximal half of the same margin; apex slightly narrower and more sharply rounded than in *A. devia;* sutural margin slightly more arcuate than in *A. devia,* distad more roundly approaching the narrower apex: marginal field broad, scapular field with twelve regularly spaced costal veins or rami of the same, discoidal sectors five to six definitely evident, oblique; anal field in form and proportions as in *A. devia.* Wings falling but faintly short of tegminal apices when in repose.

Distal abdominal tergite (supra-anal plate) short, strongly transverse, low trigonal, with apex relatively broad, bearing a very distinct but shallow and wide arcuate-emargination, lateral portions of distal margin very faintly concave. Distal abdominal sternite (subgenital plate) asymmetrical, somewhat longer on sinistral side than on dextral side: sinistral section of margin, as seen from venter, oblique, virtually straight, directed disto-mesad, passing by a faint obtuse-angulation to the broad, transverse distal margin, which is very shallowly broad concave at stylar bases; dextral section of margin, as seen from venter, moderately oblique, much less strongly mesad in its distal trend than sinistral side, proximad, and ventrad of base of dextral cercus, moderately expanded arcuately, distal half straight: sinistral style short, broad, low subtrigonal, directed obliquely mesad, apex acute; dextral style twice as long as sinistral, slender as seen from venter, in lateral view rather broad proximad, regularly narrowing to middle, apex digitiform, narrowly rounded, faintly depressed, whole of dextral style strongly directed mesad; immediately mesad of dextral style and in contact with same is an additional acute, apparently articulate process, about half as long as dextral style; interstylar portion of distal margin of sternite on dorsal surface developed into a low, subbulbous lobe, which in caudal view is seen to be subcompressed. Cerci rather broad styliform, depressed, apices incomplete.

Limbs robust, femora heavy: cephalic femora with ventro-cephalic margin having the three to four proximal spines distinctly heavier and longer than the spinulations covering most of same margin; distal spines two. Caudal tarsi damaged.

*Allotype.*—♀; Paget West, Bermuda. January 19, 1909. (F. M. Jones.) [Academy of Natural Sciences of Philadelphia.] Differing from the above description of the male sex in the following noteworthy features.

Size slightly larger. Head with interspace between eyes proportionately broader, when compared with that between antennal scrobes as 20 to 23. Pronotum faintly longer in proportion, greatest length contained nearly one and one-half times in greatest width of same. Tegmina and wings as in male. Distal abdominal tergite (supra-anal plate) transverse, broad trigonal, apex deeply and rather narrowly rectangulately emarginate, lateral portions of distal margin straight converging, tergite in transverse section roundly tectate. Distal abdominal tergite (subgenital plate) relatively large, distal margin arcuate. Caudal tarsi moderately elongate, subcompressed, in total length about two-thirds that of caudal tibia; other articles together about three-fourths as long as metatarsus (as 28 to 36).

General colors as in *A. devia*, basic elements of pattern similar. Pronotum with dark lyrate pattern much more complicated, as shown in figure (Pl. VII, fig. 11), the lateral bars lighter, joined cephalad by a regular, moderately arcuate bar continuous with them, internal spur of lateral bars longer, more pronounced and recurved; disk with a central figure consisting of a transverse arcuate bar, narrowing laterad and joining lateral bars, a pair of dots placed near the spurs of lateral bars and finely connected with transverse bar, and caudad a delicate, elongate, narrow, reversed Y-shaped figure occupying much of median axis of disk. Tegmina and abdomen patterned as in *A. devia.*

Intensive and recessive color extremes show some variation in the strength of the interocular dark bar and the depth of the abdominal infuscation. In the extreme intensive condition of the latter, with the exception of a median zinc orange area and narrow pale lateral borders, the venter of the abdomen is entirely prout's brown. Immature individuals representing at least two instars show the distinctive features of the pronotal pattern as pronounced as in adults.

*Measurements (in millimeters)*

| | Length of body | Length of pronotum | Greatest width of pronotum | Length of tegmen | Greatest width of tegmen |
|---|---|---|---|---|---|
| ♂, *type* | 9 | 2.68 | 4.07 | 5.54 | 2.68 |
| ♂, *paratype* | 8.2 | 2.68 | 3.61 | 4.78 | 2.43 |
| ♂, *paratype* | 8 | 2.52 | 3.61 | 4.28 | 2.18 |
| ♀, *allotype* | 9.4 | 2.91 | 4.36 | 5.37 | 3.44 |
| ♀, *paratype* | 8.6 | 2.91 | 4.03 | 5.20 | 2.68 |

In addition to the type and allotype I have before me one male and two female paratypes, all from Paget West, Bermuda, collected by Mr. Jones. One male was taken January 2, 1909, and the others on May 19, 1909. I have also before me five immature specimens representing both sexes, taken by the same collector in Paget West, January 6, March 24 and May 17, 1909, and one immature individual taken February 24, 1910, by E. G. Vanatta in Paget Parish near Hamilton. All the specimens examined are the property of the Academy of Natural Sciences of Philadelphia.

**Aglaopteryx vegeta**[14] new species (Pl. VII, fig 14; Pl. VIII, figs. 1–4.)

1927. *Aglaopteryx diaphana* Rehn and Hebard, Bull. Am. Mus. Nat. Hist., LIV, p. 8. (In part) [Pleasant Hill and between Pleasant Hill and St. Helen's Gap, Blue Mountains, Jamaica.]

This Jamaican species can at once be separated from the other West Indian species of the genus by the short and strongly infundibuliform penultimate palpal article. In addition the cerci are shorter and broader, the limbs are heavy and the caudal tarsi proportionately shorter and more robust, with the metatarsus more subinflated than in the related forms. The tegmina are shorter than in any other West Indian species except *A. occulta*, while the shape and character of the distal abdominal sternite (subgenital plate) of the male and of the styles are distinctive.

*Type.*—♂; Pleasant Hill, Blue Mountains, Jamaica. Elevation, 3660 feet. July 24, 1923. (Rehn.) [Academy of Natural Sciences of Philadelphia, Type no. 5485.]

Size relatively small; form as in *A. devia*.

Head form as usual in genus; interspace between eyes equal to four-fifths that between internal margins of antennal scrobes (as 19 to 23). Palpi robust; ultimate article slightly longer than antepenultimate (as 30 to 27), former relatively heavy, elongate securiform in profile, latter subcylindrical, narrowing proximad, there faintly arcuate; penultimate article slightly more than two-thirds as long as ultimate (as 21 to 30), strongly infundibuliform (see Pl. VIII, fig. 2), greatest distal depth in profile contained but two and one-third times in greatest length of same (as 9 to 21).

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[14] From *vegeta*—meaning lively, vigorous.

Pronotum with form as in *A. devia* except that the caudo-lateral angles are less rounded, caudal margin thus appearing straighter: greatest length of pronotum contained one and one-half times in greatest (caudal) width of same (as 35 to 54).

Tegmina strongly coriaceous, relatively short, leaving five distal abdominal tergites completely exposed, in form ovate-elliptical, greatest (median) width contained twice in greatest length of same (as 32 to 64): costal margin almost regularly arcuate, with but little difference between proximal and distal halves; sutural margin but weakly arcuate, more strongly so in distal fifth, apex more sutural in position, rather narrowly rounded: marginal field quite broad; scapular field broad, relatively short, with costal veins and rami of same diverging from the discoidal more abruptly than in *A. devia* or *occulta*, thirteen in number; discoidal rami little evident; anal sulcus subobsolete by reason of the corneous character of the tegmen. Wings reaching to apex of tegmen when in repose.

Abdomen with distal tergite (supra-anal plate) broad trigonal, with apex transverse truncate, rounding laterad to the oblique, faintly concave lateral portions of the margin; surface of plate weakly declivent distad. Cerci broad fusiform, median width contained three and one-half times in greatest length of same, apex acute, form deplanate. Distal abdominal sternite (subgenital plate) as seen in ventral view with sinistral margin sinuately convergent to disto-sinistral angle, which is broadly rounded, sinistral (infra-stylar) section of distal margin truncate, slightly oblique, dextral section rather strongly concavo-excavate, dextro-distal angle (infra-stylar) obtusely rounding to the weakly arcuate and obliquely convergent dextral margin: dextral style inclined toward median line, in external respect by its median constriction weakly resembling an hour-glass, internal side completely excavate, apex in external aspect rounded; sinistral style short, thick, terminating in an acute thorn-like spine, dorsal surface of style with a decided but rounded inflation; within concavity of internal side of dextral style is placed an accessory replica of this style, similarly excavate and attached to the distal margin of the tergite at the stylar base.

Legs robust: femora distinctly enlarged; cephalic femora with ventro-cephalic margin bearing a numerous series of spinulations (33+), the bulk of which are quite short but relatively robust, a number of the more proximal slightly larger and more spaced than the others, distal pair of spines quite large, distal one the longer: tibiae relatively heavy, subcompressed: caudal tarsi nearly three-fourths as long as caudal tibiae (as 65 to 95), compressed; caudal metatarsus in lateral view appreciably but gradually enlarging in proximal half (see Pl. VIII, fig. 4), in length comprising slightly more than half tarsal length (as 35 to 64); second article but little less in length than remaining distal articles.[15]

*Allotype.*— ♀ ; same data as type. [Academy of Natural Sciences of Philadelphia.]

Differing from the description of the male type in the following noteworthy features.

Size larger. Distal abdominal tergite (supra-anal plate) trigonal, slightly more produced than in related species, apex arcuately V-emarginate, lateral sections of distal margin nearly straight oblique. Distal abdominal sternite (subgenital plate) full, distal margin arcuate.

Pale base color of dorsal and ventral surfaces ochraceous-buff to pale yellow ocher, overlaid dorsad with a characteristic pattern of mummy brown to blackish fuscous. Head with occiput faintly tawny, dark interocular bar of suffusing color broad, ventrad reaching to between antennal scrobes, occasionally with a mesoventrad enclosed pale spot; face ventrad of interocular bar with a pair of small dark spots of variable intensity; eyes cinnamon brown to blackish fuscous; antennae fuscous, paling proximad. Pronotal disk (see Pl VIII, fig. 1) with dark lateral bars heavy, zig-zag, pronounced external margins doubly obtuse-angulate, cephalad acute, rarely there bearing mesad directed, narrowing, transverse, nearly connected dark lines, internal margins of dark lateral bars following general trend of external margins of same, lateral dark bars connected along caudal margin; pale disk with a pair of groups of dark nucleiform spots and a caudal pair of small dots connected to a variable degree with an equally variable double medio-longitudinal dark axial streak, which is at most indicated only as far cephalad as the cephalic edge of the nucleated markings. Tegmina with dark pattern much as in *A. devia* but proximal section heavier and longer, distal somewhat weaker and less broadly infuscate. Dorsum of abdomen with a variable degree of infuscation, lateral margins always light ochraceous-buff, infuscation solid or with variable degrees of ochraceous-tawny mesad, rarely as light as dull ochraceous-orange. Cerci with dorsum light ochraceous-buff, fuscous tipped and with a patch of fuscous of variable distinctness on internal margin faintly distad of middle; venter of cerci of same base color, fuscous tipped, with most of disto-median surface infuscate similarly except for preapical pale annulus and external margins. Tibial spines zinc orange to tawny, those of extensor surfaces having the tibiae at the spine bases narrowly marked with fuscous.

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[15] One caudal tarsus of type possesses but four articles. In this the second article is equal in length to the other more distal ones.

*Measurements (in millimeters)*

| | Length of body | Length of pronotum | Greatest width of pronotum | Length of tegmen | Greatest width of tegmen |
|---|---|---|---|---|---|
| ♂, Pleasant Hill, *type* | 10 | 2.91 | 4.53 | 5.29 | 2.85 |
| ♂, " " *paratype* | 10 | 3.02 | 4.45 | 5.37 | 2.91 |
| ♀, " " *allotype* | 11.2 | 3.10 | 4.62 | 5.29 | 3.19 |
| ♀, " " *paratype* | 10.6 | 3.19 | 4.62 | 5.12 | 2.91 |
| ♀, between Pleasant Hill and St. Helen's Gap, *paratype* | 12.3 | 3.27 | 4.78 | 5.46 | 3.69 |

In addition to the type and allotype I have before me four paratypic males and two paratypic females. The males all bear the same data as the type and allotype, and were taken in association with them. One female was taken at Pleasant Hill, July 25, 1923, at an elevation of 3700–3800 feet, and the other one on the same date at 4400 to 4780 feet between Pleasant Hill and St. Helen's Gap. Except for size variation the paratypic series shows no important differences. I have also before me a series of seven immature individuals representing two instars and both sexes. These specimens bear the same data as the type, aside from two from Pleasant Hill secured at 4400 to 4780 feet on July 28, 1923.

## Various New Species

### PSEUDOMOPINAE

**Eudromiella arara**[16] new species (Pl. VIII, figs. 5–7.)

This species is closely related to *E. chopardi* Hebard[17] and *bequaerti* Rehn,[18] as well as showing marked resemblance to *E.*

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[16] An aboriginal stock of fierce warriors, which inhabited territory not far from the type locality of this species.

[17] Proc. Acad. Nat. Sci. Phila., LXXVIII, p. 149, pl. 12, figs. 13–15, (1926). [♂, ♀; St. Jean du Maroni, French Guiana.]

[18] In press in Arkiv fòr Zoologi.

[19] Proc. Acad. Nat. Sci. Phila., LXXVIII, p. 151, pl. 12, figs. 16 and 17, (1926). [♂; Nouveau Chantier, lower Maroni River, French Guiana.]

*maroni*[19] and *bicolorata* Hebard.[20] With *chopardi* it differs from *bequaerti* in the pronotum being less expanded and not as transverse, although the pattern of the pronotum is more nearly that of *bequaerti*. The interocular space is broader than in *bequaerti* and narrower than in *chopardi*. The size is less than in *bequaerti* and subequal to that of *chopardi*, while the details of the abdominal apex of the male are nearer those found in *bequaerti* than in *chopardi*. When critically compared the distal sternite of the abdomen of the male of *arara* is seen to differ from that of *bequaerti* in having the dextral style more rectangulate and less narrowing distad in profile than in the latter species, and the sinistral angle of the sternite is less crassately acute. The distal tergite of the male is also more deeply and sharply fissate at the apex in *arara* than in *bequaerti*.

From *maroni* the present species can at once be separated by very distinctive genital details, while from *bicolorata* similar differences, the less transverse pronotum and proportionately broader head will at once distinguish *arara*. My *inexpectata*, from British Guiana, is a much larger, more unicolorous insect with distinctive genitalic features.

The species *chopardi*, *bequaerti*, *maroni* and *arara* apparently are restricted to distinctive areas in Lower Amazonia and the Guianas, and at a casual glance they could easily be confused. The differences which separate them, however, are clearly evident on careful examination.

*Type.*—♂; Parintins, State of Amazonas, Brazil. October 3, 1919. (H. S. Parish.) [Hebard Collection, Type no. 1179.]

Size relatively small; form lanceolate; surface polished.

Head faintly deeper than breadth across eyes (as 47 to 45), appreciably attenuate toward buccal region, outline of eyes and occiput as seen in cephalic aspect regularly arcuate: occipital interspace between eyes slightly less than half that between internal margins of antennal scrobes (as 14 to 31). Palpi moderately elongate; ultimate article slightly shorter than penultimate (as 29 to 31), which latter is same length as antepenultimate; ultimate article distinctly securiform, penultimate article attenuately infundibuliform, antepenultimate article elongate cylindrical. Antennae somewhat longer than body.

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[20] Mem. Am. Ent. Soc., no. 4, p. 35, pl. 7, figs. 16–20, (1920). [♂, ♀; Tabernilla and Empire, Canal Zone, Panama; Taboga Island, Panama.]

Pronotum moderately transverse ovate, greatest length equal to three-fourths of greatest width of same (as 35 to 47), latter very slightly caudad of middle of pronotum: cephalic margin transverse truncate for a distance faintly more than one-third of greatest pronotal width, this rounding laterad into the diverging, gently arcuate cephalic portions of lateral margins, these portions in turn broadly rounding over point of greatest width to the abbreviate, caudad converging portions of the lateral margins; caudal margin low obtuse-angulate, narrowly rounding laterad into the caudal sections of lateral margins: surface of pronotum very gently arcuate transversely on disk, more distinctly declivent in hyaline lateral sections, vicinity of caudal margin weakly but appreciably decurved.

Tegmina elongate lanceolate, greatest median width contained about three and one-third times in greatest length of same, median half of tegmen subequal in width; costal margin but faintly arcuate for most of its length, more decidedly so in proximal third and distad sharply arcuate to the narrowed but rounded apex; sutural margin in area of anal field gently arcuate, straight for some distance distad of anal sulcus juncture, then broadly arcuate to apex of tegmen: marginal field of moderate width, in greatest length nearly third that of entire tegmen; scapular field in width very slightly less than half that of entire tegmen; anal field subpyriform, greatest width slightly less than half length of same field: costal veins twenty-one in number, counting all rami within scapular field; discoidal sectors (all) ten in number, weakly oblique near sutural margin, longitudinal in distal section; anal sulcus with diagonal section non-flexuose; axillary veins five in number. Wings ample, moderately elongate, apex angulate as same area in tegmina; medio-discoidal area and medio-ulnar area approximately subequal in width: costal veins fourteen in number, the nine more proximal distinctly clavate; ulnar vein triramose, two rami bifurcate.

Dorsum of abdomen with sixth tergite having distal margin shallowly angulate emarginate mesad, which latter area is supplied with a distinct fringe of horizontally disposed, caudad directed hairs: seventh tergite with a proximo-median glandular area consisting of a transverse proximal depression overlaid by a proximad directed, relatively broad lobe, which in dorsal view is transverse and has its margin broadly arcuate, the dorsal surface of the lobe also medio-longitudinally impressed; distal half of surface of seventh tergite divided into four shallow longitudinal concavities by irregular carinulae. Ultimate tergite (supra-anal plate) trigonal, slightly transverse, apex markedly V-emarginate, lateral portions of distal margin distinctly concave, apices of terminal lobes rounded acute. Cerci elongate, relatively slender, acuminate, articles clearly delimited except proximad. Ultimate abdominal sternite (subgenital plate) asymmetrical, as usual in genus, subrostrate: margin, as seen in ventral aspect, bearing at extreme sinistral side an acute, laterad directed lobule cephalad of base of cercus, thence oblique sinuate to base of broad, vertically disposed sinistral style, the margin ventrad of style shallowly concave, and passing to a compressed median lamella, which on its dorsal margin bears a longitudinally disposed series of shagreenous teeth, margin similarly concave ventrad of dextral style, thence dextrad less oblique than sinistrad, extending in nearly a straight line to a subrectangulate lamellate development ventrad of the dextral cercus, lateral margin of sternite sharply truncate longitudinally: sinistral style in sinistral aspect ovate in outline, faintly acute distad, its length and width as 23 to 16, external surface with two broad impressed areas bearing numerous shagreenous points; dextral style similar to sinistral in vertical disposition, somewhat longer, external face strongly concave, dextral aspect roughly trapeziform in outline, distinctly narrowing distad, dorso-distal angle with a short dextrad recurved process bearing a few shagreenous teeth.

Cephalic femora with three distal spines on ventro-cephalic margin, other spination of same margin with five well spaced larger spines proximad, the series then reducing in size distad, exclusive of the distal group ten to eleven in number. Caudal tarsi elongate, with metatarsus nearly two-fifths as long again as remaining tarsal articles (as 70 to 52).

General pale color of disk of pronotum, most of tegmina, head and limbs dull ochraceous-orange to buckthorn brown. Pronotum laterad hyaline tinted with ochraceous-buff, narrowly margined with tawny; pronotal disk clear dull ochraceous-orange mesad, bordered laterad with a pair of sinuate, caudad widening bars of cinnamon-brown (see Pl. VIII, fig. 5). Tegmina with marginal field and costal section of scapular field hyaline tinted with ochraceous-buff, immediate margin in proximal half of tegmen pencilled with tawny, section of darker color mass adjacent to hyaline area appreciably but not solidly washed with prout's brown, this, however, relatively solid on proximal fourth of humeral trunk. Wings washed with weak cinnamon-brown, heavily so in marginal area, veins pencilled with prout's brown. Dorsal surface of abdomen prout's brown to mummy brown, with scattered areas of apparently underlying pale coloration. Cerci of general pale color clouded with dark on proximal fourth. Head with inter-ocellar and inter-antennal area bearing paired but indefinite clouds of darker coloring; eyes mummy brown speckled with ochraceous-tawny; antennae prout's brown to cinnamon-brown, except for the two proximal articles which are of the pale base color. Ventral surface of abdomen largely dresden brown to cinnamon-brown, narrow lateral margins buckthorn brown. Tibial and femoral spines tawny, at the bases of the former the tibiae are marked with cinnamon-brown.

Length of body, 11.3 mm.; length of pronotum, 2.91; greatest width of pronotum, 3.78; length of tegmen, 12.2; greatest width of tegmen, 3.78.

The type of this species is unique.

**Sciablatta ega**[21] new species (Pl. VIII, figs. 8–11.)

A very distinct species from the three recently described ones which have been referred to the genus, i.e. the genotype *S. mamatoco,*[22] *galibi*[23] and *poecila,*[24] all of Hebard. The present new species can at once be separated from *poecila* by its much larger size, less transverse pronotum, more longitudinal tegminal sectors, less elongate pyriform tegminal anal field, much more elongate penultimate palpal article, more elongate cerci, genitalic details of the male, and the absence of a punctulate pattern. From *mamatoco* and *galibi*, which are of the same general size, the present species differs in its slightly less transverse pronotum, in the presence of scattered elongate hairs on the dorsal surface of the abdomen, in the exact detailed structure of the subrostrate distal sternite and of the sinistral concealed genitalic appendage of the male.

From Walker's *Blatta varicornis,*[25] which may be referable to *Sciablatta, ega* differs in its much larger size, its uniform coloration, and doubtless structural features not mentioned by Walker. I have before me the types of *S. mamatoco* and *galibi* and a topotype of *poecila* determined by its author.[26]

*Type.*—♂; Teffe, State of Amazonas, Brazil. December 17, 1920. (H. S. Parish.) [Hebard Collection, Type no. 1178.]

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[21] An alternative name for the type locality of this species.

[22] Trans. Am. Ent. Soc., XLVII, p. 115, pl. 8, figs. 6 and 7, (1921). [♂, ♀; Mamatoco, Department of Magdalena, Colombia.]

[23] Proc. Acad. Nat. Sci. Phila., LXXVIII, p. 156, pl. 14, fig. 15, (1926). [♂; St. Jean du Maroni, French Guiana.]

[24] Proc. Acad. Nat. Sci. Phila., 1921, p. 196, pl. 9, figs. 12–15, (1921). [♂; St. Jean du Maroni, French Guiana.]

[25] Catal. Blatt. Brit. Mus., p. 216, (1868). [♂; Santarem, Brazil.]

[26] The specimen reported as taken with type by Hebard, Proc. Acad. Nat. Sci. Phila., LXXVIII, p. 157, (1926).

Size medium; form subdepressed; surface moderately polished. Head in cephalic aspect elongate cordiform, greatest depth slightly greater than width across eyes (as 68 to 60), eyes moderately prominent ventro-laterad, dorsad in outline continuous with curve of occiput; interocular space of frons equal to two-thirds width between antennal scrobes. Palpi slender; ultimate article appreciably shorter than penultimate or antepenultimate articles, the latter two subequal, the ratio reading proximad being 33, 40 and 41; ultimate article in profile trigono-securiform, penultimate infundibuliform, antepenultimate subcylindrical. Antennae somewhat surpassing body in length, with distinct but spaced bristling distad of immediate proximal section.

Pronotum in outline moderately transverse ovate, greatest width equal to one and one-third times greatest length of same (as 60 to 43), transverse axis very slightly caudad of middle: cephalic margin dorsad of head transverse truncate, rounding laterad to obliquely arcuate cephalic sections of the lateral margins, these broadly rounding over point of greatest width to brief caudad converging arcuate sections, which pass obtusely into the shallowly sinuato-arcuate caudal margin; hyaline lateral areas broad; in transverse section pronotum is regularly and broadly arcuate.

Tegmina surpassing apex of abdomen by length of pronotum, lanceolate, costal and sutural margins in part subparallel, greatest median width contained three and one-fifth times in greatest length of same: costal margin moderately arcuate in proximal half, thence nearly straight and briefly distad rather sharply arcuate to the narrowly rounded apex; sutural margin briefly arcuate proximad, largely straight thence, sharply but more broadly arcuate distad to apex: marginal field relatively broad, narrowing rather markedly distad, briefly failing to reach middle of tegmen; scapular field broad, at widest point comprising half of full width of tegmen; anal field elongate pyriform, greatest width of field, which is faintly proximad of middle, contained two and one-half times in greatest length of same: costal veins of tegmina, with rami numbering twenty to twenty-two, regularly spaced; discoidal sectors and rami numbering thirteen to fourteen, longitudinal near median axis of tegmen, more oblique toward sutural margin; anal sulcus nearly straight oblique for half of its length, sharply falcate distad and joining sutural margin at a right angle; axillary veins seven in number. Wings in repose very faintly surpassing apices of tegmina; apex of wings very similar to same region of tegmina in angulation and form: true costal veins thirteen in number, seven weakly thickened distad; discoidal vein nearly straight; medio-discoidal area mesad subequal in width to medio-ulnar area; ulnar vein quadriramose, one or more of the rami further subdivided.

Abdomen with dorsal surface bearing numerous scattered crinkly hairs, these most abundant and longer on the third and fourth tergites preceding the ultimate one; third tergite preceding the ultimate one mesad with a folded, erect gable-like structure of the distal margin, immediately proximad of which is a shallowly impressed, apparently glandular area, distal margin of this tergite concave laterad; ultimate tergite (supra-anal plate) broad and low trigonal in form, apex briefly transverse truncate, lateral sections of distal margin nearly straight oblique, surface of tergite broadly concave medio-longitudinally. Cerci elongate, slender, acute, in length subequal to pronotum, in width subequal in proximal half, tapering in distal half, articles there sharply defined, apex finely aculeate, subdeplanate dorsad, laterad and ventrad well supplied with erect chaetae. Ultimate sternite (subgenital plate) subrostrate, moderately broad and arcuate in transverse section: distal margin moderately asymmetrical, sinistral section as seen from venter nearly straight oblique from a subrectangulate sinistral angle to the base of the broad, sublamellate, vertically inserted and low arcuate, sinistral style, surface of the section toward the margin between the cercal and stylar bases deflexed dorsad and deplanate; interstylar section of distal margin, as seen from venter, unequally subrectangulate, but bearing on its dorsal surface an erect chitinous digitiform production with a recurved, bill-hook-like extremity; dextral side of distal margin of sternite essentially the reverse of sinistral side, except that the immediate margin is more reflexed dorso-cephalad and the dextral style proportionately is similar to the sinistral but broader. Apex of normally concealed sinistral internal genitalic appendage falcate, distal half of the chitinous section regularly arcuate ventrad, an accessory claw-like tooth, not more than a third the length of the main arm, present on dorso-sinistral side of process.

Femora of all limbs robust, tibia moderately compressed. Cephalic femora with ventro-cephalic margin bearing a series of twelve spines of similar character, regularly spaced except for becoming more distant proximad, and decreasing in length distad, apical large pair on this margin unequal; ventro-caudal margin with five to six long, spaced spines. Caudal tarsi with metatarsus equal to nearly half again as long as remaining articles together (as 48 to 34). Tarsal articles supplied with pulvilli; arolia large. Tarsal claws equal, internal margins simple.

General color of pronotal disk, anal, scapular and discoidal fields of tegmina, head, abdomen and limbs pale buckthorn brown, subhyaline lateral areas of pronotum and marginal fields of tegmina ochraceous-buff. Head on interocular area marked with three vertical lines of prout's brown, one on each side and a median one which encloses a narrow median paler area; interocellar area largely infuscate; eyes dark prout's brown, paling laterad to cinnamon-brown: antennae dresden brown. Pronotal disk weakly infuscate clouded, a pair of obliquely disposed, short converging lines of mummy brown mesad and a more closely placed, caudad disposed pair of dots of the same color forming its more evident pattern. Tegmina with venation ochraceous-buff, distad the short cross-veins are similarly marked; longitudinal veins, chiefly of scapular and discoidal fields, bordered laterad by regular series of quadrate small dots of prout's brown, which markedly relieve the pale longitudinal veins. Wings faintly washed with very pale buckthorn brown, veins pencilled with buckthorn to dresden brown. Dorsum of abdomen with broad lateral areas of dark prout's brown, which shade also margins the individual tergites meso-caudad, narrow pale borders of the base color present laterad: venter of abdomen indefinitely clouded laterad with dark prout's brown.

Length of body, 14.4 mm.; length of pronotum, 3.61; greatest width of pronotum, 4.87; length of tegmen, 15.3; greatest width of tegmen, 4.80.

The type of this species is unique.

**Cariblatta advena** new species (Pl. VIII, figs. 12–14.)

A member of the Reticulosa Group of the genus[27] and comparable only with the two other members of the group, both of which occur in Jamaica. From *C. reticulosa* (Walker)[28] the new species differs chiefly in its slightly larger size, the replacement of the transverse dark facial bars of the former by series of small dots, in the paired dark pronotal bars being more sharply and definitely outlined mesad, not anastomosing with elements of dark pattern of the median pale area, in the penultimate article of the palpus being longer than the ultimate, instead of subequal, and in the median inter-stylar section of the distal margin of the ultimate sternite (subgenital plate) of the male being very narrow and markedly emarginate. From *C. nebulicola* Rehn and Hebard,[29] the other member of the Reticulosa Group, the present species differs chiefly in its smaller size, less elongate general form, in the same color features of the head and pronotum as separate it from *reticulosa,* also the same slightly longer proportion of the penultimate palpal article, and in the same feature of the ultimate sternite as separates *advena* from *reticulosa.*

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[27] See Rehn and Hebard, Bull. Am. Mus. Nat. Hist., LIV, pp. 14, 18–20, (1927).

[28] Catal. Blatt. Brit. Mus., p. 103, (1868). [♂; Jamaica.]

[29] Bull. Am. Mus. Nat. Hist., LIV, pp. 14, 19, pl. 1, fig. 1, (1927). [♂, ♀; Morces Gap, Blue Mountains, Jamaica.]

The new species as a whole is nearer *reticulosa* than it is to *C. nebulicola,* and is the first representation of the species group to be reported from Hispaniola. While superficially it appears very similar to *reticulosa,* the genital features of the male and the facial and pronotal color characters will readily distinguish *advena.*

*Type.*—♂; Fond des Negres, Massif de la Hotte, Haiti, Hispaniola. February 14, 1930. (H. L. Dozier.) [Academy of Natural Sciences of Philadelphia, Type no. 5501.]

Size medium (for genus); form as in related species.

Head with greatest depth subequal to width across eyes; interocular space at occiput relatively narrow, little more than half as great as interspace between antennal scrobes (as 8 to 15). Palpi with distal article distinctly shorter than penultimate article, latter a fourth again as long as former (as 20 to 16); penultimate article moderately and regularly infundibuliform; antepenultimate article subequal in length to penultimate.

Pronotum in form as in related species, greatest length contained one and one-half times in greatest pronotal width.

Tegmina surpassing apex of abdomen by slightly more than pronotal length, in character as in related species; costal veins seventeen in number, five discoidal sectors, five axillary veins.

Distal sternite of male (subgenital plate) moderately asymmetrical, lateral "wings" of sternite divergently, concave laterad, to cercal bases: distal margin of sternite arcuate oblique sinistrad from base of sinistral style, which latter is very brief, little evident in ventral aspect, nodiform, and ventrad of it the margin shows a small lappet-like lobation, which bears a few minute recurved teeth; section of distal margin of sternite between styles hardly wider than basal width of dextral style and distinctly though rather shallowly subquadrate-emarginate, with a median brief linguiform lobation and lateral borders of same area somewhat oblique divergent; dextral style larger than sinistral, lobiform, in ventral aspect with its outline arcuate dextrad, straight mesad, surface of style ventro-mesad concavely excavate; portion of distal margin of ultimate tergite ventrad of dextral style briefly truncate from central emargination, thence oblique to lateral base of tergite, in large part straight; a few recurved spines present ventrad at base of dextral style and on adjacent base of same. Distal tergite strongly transverse, low trigonal; distal margin with a shallow median rectangulate emargination. Cerci elongate subfusiform, three times as long as distal sternite.

General color pattern basically as in *C. nebulicola* Rehn and Hebard, with the following differences: pale base color of head, limbs, abdomen and median section of pronotal disk nearer light ochraceous-buff; pronotal dark bars more even in width, slightly widening caudad, sharply defined against pale median section of disk, latter caudad with a single pair of small, closely placed dark dots and on median transverse axis with a more remote pair of subtrigonal dark spots; dark bar of tegmina distinct, even, continuous and in width broadening slightly mesad, humeral and continuous in position with the dark pronotal bars, markedly separating the more hyaline costal section from the more dresden brown anal and discoidal fields, in which the venation is pencilled in prout's brown. Head with interocular dark bar rather broad, ventral border straight, dorsal concave; face pale with a transverse series of four spaced dark dots at level of ventral border of antennal scrobes, series arcuate, lateral dots the larger; second transverse series of two dark dots ventrad of main series, another line is represented by two (one weak) immediately between antennal scrobes: palpi progressively infuscate distad; antennae of pale face color immediately proximad, thence infuscate in their entirety.

Length of body, 8 mm.; length of pronotum, 1.72; greatest width of pronotum, 2.64; length of tegmen, 9.2; greatest width of tegmen, 2.94.

The type of this beautiful and most interesting species is unique.

## PANCHLORINAE

**Lauxoblatta**[30] **magnifica** new species (Pl. IX, figs. 1–3.)

This very large and striking species is more nearly related to *L. emarginata* (Burmeister), the genotype, than to any other, agreeing in general form and major color features, but differing in its much greater size, in which it far surpasses any previously known species of the genus, in the pronotal surface being tuberculose instead of impresso-punctate, in the distal section of the costal margin of the tegmina being more gradually and less sharply oblique subtruncate, in the tegminal apices being more fully rounded and less oblique subtruncate on sutural side, in the anal field of the tegmina being shorter proportionately to the tegminal length, in the finer areolation of the tegmina, in the broader head, in the heavier cerci and the more deeply emarginate distal tergite (supra-anal plate) of the female sex.

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[30] See *Lanxoblatta* Rehn, in current Arkiv for Zoologi. This name must be used in place of *Zetobora* as understood by Kirby, *Zetobora* properly replacing *Tribonidium* Saussure. By pure inadvertence Hebard, unaware of an unexpected delay in the appearance of the report on the Blattidae of the Roman collection in the Arkiv, recently quoted this new generic name and cited the type species, thus anticipating my more detailed treatment. The name, there incorrectly given as *Lauxoblatta,* must date from Hebard, Konowia, x, p. 259, (1931).

*Type.*— ♀ ; Caiary-Uaupes River, State of Amazonas, Brazil.[31] November, 1906. (H. Schmidt.) [American Museum of Natural History.]

Size large; form deplanate, onisciform and cucullate as usual in genus; surface dully polished over the sculpture of the dorsal surface, highly polished on venter of pronotal cowl, on head and venter of abdomen.

Head completely covered by pronotum, in cephalic aspect slightly deeper than broad across eyes (as 63 to 56), broad ovate cordiform; outline of interocular section of occiput shallowly but appreciably concave, the depression extending ventrad on face to between antennal bases, there shallow but very broad; interspace between eyes at occiput contained slightly more than four and one-half times in the interspace between internal margins of antennal scrobes: eyes in lateral aspect subreniform, broader dorsad. Antennae not exceeding half the body length. Palpi with penultimate article short, three-fourths as long as ultimate (as 21 to 28), distinctly infundibuliform; ultimate securiform; antepenultimate article intermediate in length between penultimate and ultimate (25), heavy, cylindrical, faintly arcuate.

Pronotum cucullate with cephalic arcuate margin narrowly reflexed as usual in genus, greatest length contained one and three-fifth times in greatest width of same, latter point very faintly caudad of longitudinal median point: arcuation of broad cephalic margin regular; lateral angles at point of greatest width subrectangulate, bearing immediately caudad a small and rather shallow, but pronounced concave emargination of the margin; caudal section of margin between these lateral emarginations strongly arcuate with a very faint median obtuse-angulation: surface of pronotum with a boss-like convexity above the head, thence caudad a pair of rough but not definitely cut diverging cariniform shoulders, which reach caudal margin adjacent to base of humeral trunk of tegmen, the area caudad of the head boss and between these shoulders impressed obliquely caudo-laterad of the former, mesad of the shoulders and immediately within caudal margin; surface adjacent to arcuate cephalic margin reasonably impresso-concave transversely; micro-sculpture of pronotum consisting of a close and fine pattern of spiculose tuberculations and a grosser, sparser pattern of larger, pustulose tubercles, the latter somewhat adpressed laterad and erect, circular and regularly spaced meso-cephalad.

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[31] This river in the upper part of its course flows through the Uaupes Territory of Colombia, and there is a possibility that, with the imperfect definition of frontiers existing in Upper Amazonia, the present specimen may have come from the Colombian side of the boundary. The label, however, states "Amazonas, Brazil."

Tegmina surpassing apex of abdomen by half length of pronotum, in general form subrectangulate (see Pl. IX, fig. 1), greatest width (median) contained slightly more than twice in greatest length of same: costal margin nearly straight in slightly more than proximal half except for a brief pronounced proximal arcuation, distal two-fifths moderately and subarcuately oblique to apex, which is broad, equal to two-thirds of greatest tegminal width, gently oblique arcuato-truncate toward sutural side, well rounding into costal margin and rather broadly arcuate to sutural one, which latter as a whole is nearly straight, the sections on each side of anal sulcus faintly arcuate individually: marginal and scapular fields broad, in width equal to but little less than half of tegmen at apex of anal field; latter in greatest length equal to two-fifths of total tegminal length: texture of tegmina as a whole coriaceous, surface of the undifferentiated marginal and scapular fields strongly impressed cribroso-punctulate proximad passing to quadrately multiareolate as the costal veins are reached; most of anal field and extreme base of discoidal field seriately impressed cribroso-punctulate disposed intervenously, passing distad to quadrate multiareolate as in scapular field: costal veins numerous, not clearly defined from the intercalated nervures in the same area; discoidal sections no more prominent or definite than the numerous intercalated nervures, all moderately fan-like in disposition; anal sulcus broadly arcuate with a brief sigmoid section immediately distad, joining sutural margin at an angle slightly acute. Wings in repose reaching to tegminal apices.

Distal abdominal tergite (supra-anal plate) large, moderately produced, distinctly and sharply V-emarginate mesad, distal and lateral margins of tergite subcrenulato-arcuate. Distal abdominal sternite (subgenital plate) large, transverse, shallowly concave marginally ventrad of cercal bases, subrostrate mesad. Cerci when extended caudad falling a little short of distal margin of distal tergite, styliform, tapering throughout, acute.

Caudal tarsi with metatarsus short, no longer than the three succeeding tarsal articles together and slightly shorter than the ultimate one.

General color of dorsal surface (i.e. much of pronotum and all of tegmina) mahogany red, tending toward chestnut on pronotum; area of pronotum cephalad of head boss ochraceous-buff, tubercles of this area of general dorsal color. Venter of pronotum and tegmina colored as on the respective dorsal surfaces. Head largely mahogany red, eyes and antennae auburn; palpi largely infuscate, apices narrowly pale buffy. Venter of abdomen and limbs hazel to vinaceous-rufous; tibial spines hay's russet, tipped with prout's brown; tarsi infuscate distad, tarsal claws ochraceous-buff, fuscous tipped.

Length of body, 41.5 mm.; length of pronotum, 12.4; greatest width of pronotum, 21; length of tegmen, 36.6; greatest width of tegmen, 17.3; greatest width across closed tegmina (normal position), 25.4.

The type of this very interesting and unusual panchlorid is unique. Whether the species is of localized distribution or a seldom encountered one of broader dispersal remains for future determination.

## CORYDIINAE

**Melestora andeana** new species (Pl. IX, figs. 4–8.)

When compared with the three previously known species properly referable to this genus, i.e. *M. adspersicollis* (genotype)[32] and *fuscella*[33] Stål and *M. argentina* (Rehn),[34] the two former known to me solely by their original descriptions, the present species is seen at once to differ in its far greater size. From *adspersicollis* and *fuscella* the present insect also can be distinguished by its more uniform coloration, apparently less strongly transverse pronotum and more regular tegminal venation. From *argentina*, with the type of which *andeana* has been compared, the latter also differs in the presence of a distinct transverse interocular occipital carina, in the broader marginal field and more acute pyriform anal field of the tegmina and in the more rounded tegminal apices.

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[32] Kongl. Svenska Fregatt. Eugenies Resa, Zool., I, Ins., p. 311, pl. 5, fig. 2, (1860). [♂; Rio de Janeiro, Brazil.]

[33] Kongl. Svenska Fregatt. Eugenies Resa, Zool., I, Ins., p. 311. [♂; Rio de Janeiro, Brazil.]

[34] Proc. Acad. Nat. Sci. Phila., 1913, p. 283, fig. 3, (1913). [♂; Misiones, Argentina.]

*Type.*—♂; Huacapistana,[35] Rio Tarma, Peru. June 1–3, 1920. (Cornell University Expedition.) [Academy of Natural Sciences of Philadelphia, Type no. 5499.]

Size very large for genus; form as usual in group; dorsal surface appreciably coriaceous, pronotum dully micro-papillose, venter moderately polished; surface largely yet rather sparsely clothed with golden hairs of at least two length categories.

Head projecting cephalad of pronotum; in cephalic aspect equally broad and deep, broad cordiform, eyes full but not prominent: interocular region one and one-half times occipital depth of eye, with a marked transverse rugose carina, bordered dorso-caudad by a prominent transverse gutter-like rugulose sulcation; front between occipital carina and antennal bases subdeplanate and with surface deeply cribroso-punctate: interspace between antennal scrobes equal to that between eyes; lower face well defined transversely from punctate upper face, polished, somewhat bullate, with an appreciable median vertical impressed line: eyes strongly reniform in lateral outline, completely encompassing caudal section of antennal scrobes. Antennae incomplete in type, remaining portion with articles moniliform, from fourth distad (preserved only to eleventh) increasing in length; proximal article relatively short, second three-fifths as long as first, third three-fourths as long as first. Palpi relatively short; distal article relatively deep trigono-securiform, greatest depth of which to dorsal length is as 11 to 15; penultimate article distinctly shorter than ultimate, markedly infundibuliform; antepenultimate article subequal to distal in length, robust, gently arcuate in profile.

Pronotum moderately transverse, greatest length (median) to greatest width as 10 to 13, in outline broad ovoid; cephalic margin broadly arcuate, broadly passing laterad into the more strongly arcuate lateral margins, caudo-lateral angles rounded obtuse, caudal margin arcuato-truncate, all margins cingulate, lateral more broadly so: surface of pronotum as a whole finely cribroso-shagreenous; premedian section of disk transversely and subelliptically shallow impressed, from and across which extends caudad a fine medio-longitudinal sulcation; oblique, broad, cephalad diverging depressions border disk laterad in caudal three-fifths; latero-cephalad the pronotal surface is rather broadly depressed within the cingulate margins, narrowing continuations of these depressions extending caudad intermarginally to virtually the caudo-lateral angles.

Tegmina (sinistral lacking) surpassing apex of abdomen by about two and one-half times median length of pronotum, lanceolate-elliptical, greatest width at distal third, contained three times in tegminal length, tegmina narrowing regularly and markedly proximad; costal margin regularly but moderately arcuate, slightly flattened mesad; sutural margin faintly arcuate in anal section, straight thence to greatest width of tegmen, finally arcuate and faintly more strongly so than corresponding portion of costal margin, to the narrowly rounded apex: marginal field of medium width, equal to two-fifths width of anal field, guttered, costal margin in field appreciably upcurved; anal field narrow acute subpyriform, its greatest width contained two and two-thirds times in length of field; width of discoidal field at broadest point of tegmen equal to three-fourths of entire tegminal width; costal veins ten in number, sublongitudinal becoming more oblique distad, numerous intercalated false costal nervures present; discoidal sectors (embracing all in field reaching sutural and distal margins) eight in number, two distal ones longitudinal, remainder sublongitudinal to oblique (proximad); anal sulcus straight oblique in distal two-thirds, joining sutural margin at an acute angle; axillary veins of uncovered portion of dextral tegmen four in number, anastomosing, of covered portion of same three in number, sharply defined; diagonal channel marked, distinct to distal fourth of tegmen. Wings reaching to tegminal apices, apical arcuation similar to that of tegmina: alar costal veins six in number, weak, their region coriaceous in proximal half.

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[35] This locality is in the cloud forest belt (Subtropical Zone), at a general elevation of six thousand feet.

Cerci simple, articles moniliform, distal article conically acute. Distal abdominal tergite (supra-anal plate) transverse, subtectate caudad, distal margin gently arcuate with a shallow median emargination. Distal abdominal sternite (subgenital plate) subtransverse, slightly asymmetrical; caudal margin broadly arcuate mesad, sinistral margin more oblique than dextral, styles inserted briefly proximad (on side margins) of junction of lateral and distal margins, simple, styliform, faintly decurved distad, on surface of sternite near base of each style is an area of spiniform chaetae.

Ventro-cephalic margins of median and caudal femora each with a distinct distal spine; caudal metatarsus slightly longer than other tarsal joints combined.

General color buckthorn brown, deepening on the pronotal disk to dresden brown. Head mummy brown, becoming shining blackish fuscous ventrad on face; eyes blackish; antennae mummy brown. Limbs and ventral surface largely washed with prout's brown to mummy brown; trochanters, distal portion of tibiae and tarsi relatively pale; meso-proximal abdominal region pale, the segments distad narrowly clouded with darker; extremity of abdomen and cerci dark.

Length of body, 8 mm.; length of pronotum, 1.97; greatest width of pronotum, 2.68; length of tegmen, 11.1.

The type of this striking species is unique. Although the sinistral tegmen is missing, the specific characters are so decided no useful purpose would be served by delaying the description of the species for the acquisition of further material.

## OXYHALOINAE

**Chorisoneura yaguas**[36] new species (Pl. IX, figs. 9–12.)

This strikingly patterned species superficially appears related to a number of contrastingly colored species of the genus, such as *pulcherrima*, *albonervosa* and *exquisita* Rehn and *elegantula* and *specilliger* Hebard, but a more careful examination of its features shows that in pronotal form, head proportions, tegminal structure, etc., it is a member of the Parishi Group of the genus, from the other species of which its marked bicolored pattern will at once distinguish it. When compared with *parishi* Rehn, the best known member of the group, aside from the marked color differences, *yaguas* is seen to differ in having fewer discoidal sectors on the tegmina, the distal sternite (subgenital plate) of the male differently shaped and the styles of the same far shorter and more robust.

*Type.*— ♂; Napo River, Loreto Province, Peru. June, 1920. (H. S. Parish.) [Academy of Natural Sciences of Philadelphia, Type no. 5502.]

Size relatively small; form appreciably depressed; surface polished, tegminal venation prominent and elevated.

Head normal not strongly deplanate as in numerous species of the genus, in cephalic aspect with greatest width across eyes slightly greater than depth of head (as 37 to 34), occipital line in cephalic view seen to be virtually straight; interspace between eyes at occiput equal to that between antennal scrobes, interocular region with area between pale bars shallowly but appreciably impresso-sulcate transversely. Palpi with distal article distinctly longer than penultimate (as 19 to 16), relatively heavy, but of outline usual in genus; penultimate article infundibuliform, strongly narrowing proximad; antepenultimate article slightly longer than ultimate, gently arcuate in lateral view.

Pronotum briefly transverse, ovate, greatest length contained less than one and one-third times in greatest width of same; cephalic margin distinctly arcuate, laterad passing into the rather broadly arcuate lateral margins, which over the very obtuse though appreciable caudo-lateral angles round into the but slightly arcuate caudal margin; in transverse section the pronotum is regularly convex.

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[36] After one of the aboriginal peoples of the Napo basin.

Tegmina elongate lanceolate, greatest width (which is at proximal fourth) contained slightly more than four times in greatest length: costal and sutural margins and apex as in *C. exquisita* Rehn,[37] but more strongly arcuate proximad, apices of tegmina surpassing apex of abdomen by no more than half length of pronotum; marginal field relatively narrow, greatest width as seen from dorsum contained three and a quarter times in width of anal field of tegmen, very faintly narrowing distad; discoidal field narrow; anal field elongate, acute subpyriform, distal two-thirds of anal sulcus gently but distinctly arcuate, meeting sutural margin at an acute angle: costal veins eleven in number; discoidal sectors of all sources seven to eight in number, largely sublongitudinal; axillary veins four in number.

Distal sternite (subgenital plate) rather narrow, nearly all of distal margin occupied by stylar sockets, disto-sinistral angle obtuse, dextral lateral margin nearly straight oblique; styles relatively short, thick, compressed, almost unguiculate in form, curved dorsad, subconcave on ventro-mesal face, their length distinctly less than length of sternite. Cerci of medium length, tapering in distal two-thirds.

General color of pronotal disk and greater portion of tegmina prout's brown, lateral portions of pronotum, marginal field of tegmina and costal half of scapular field of same hyaline, cephalic and caudal margins of pronotum bordered with opaque whitish, tegminal venation pencilled in opaque creamy white. Head with occiput and upper portion of face dull zinc orange with two transverse interocular lines of whitish, the ventral slightly arcuate and very fine, the dorsal straight and at least twice as wide; face ventrad of antennae, genae and mouth-parts prout's brown; palpi ochraceous-buff; eyes dresden brown; antennae bister, paling distad, proximal two or more articles clay color. Limbs and ventral surface of abdomen pale mars yellow, distal margin of segments narrowly bordered with opaque white.

*Measurements (in millimeters)*

| | Length of body | Length of pronotum | Greatest width of pronotum | Length of tegmen | Greatest width of tegmen |
|---|---|---|---|---|---|
| ♂, Napo River, *type* ... | 8.8 | 1.68 | 2.22 | 7.5 | 1.80 |
| ♂, Yurimaguas, *paratype* | 7.8 | 1.61 | 2.20 | 7.1 | 1.80 |

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[37] In press in Arkiv för Zoologi.

In addition to the type I have before me a paratypic male from Yurimaguas, Huallaga River, Peru, taken in 1920 by H. S. Parish, and belonging to the Hebard Collection. This specimen shows no differences from the type except its somewhat smaller size (vide supra).

## EXPLANATION OF FIGURES

### PLATE VII

Fig. 1.—*Aglaopteryx diaphana* (Fabricius). Pronotum of male. Camagüey, Cuba. (× 4.)

Fig. 2.—*Aglaopteryx diaphana* (Fabricius). Ventral view of distal abdominal sternite (subgenital plate) of male. Camaguey, Cuba. (Greatly enlarged.)

Fig. 3.—*Aglaopteryx diaphana* (Fabricius). Outline of cercus of male. Camagüey, Cuba. (Greatly enlarged.)

Fig. 4.—*Aglaopteryx diaphana* (Fabricius). Distal margin of distal abdominal tergite (supra-anal plate) of female. Camagüey, Cuba. (Greatly enlarged )

Fig. 5.—*Aglaopteryx diaphana* (Fabricius). Caudal tarsus of female. Camagüey, Cuba. (Greatly enlarged.)

Fig. 6.—*Aglaopteryx devia* new species. Pronotum of male (type). La Plata, Aguadilla, Porto Rico. (× 4.)

Fig. 7.—*Aglaopteryx devia* new species. Ventral view of distal abdominal sternite (subgenital plate) of male (type). La Plata, Aguadilla, Porto Rico. (Greatly enlarged.)

Fig. 8.—*Aglaopteryx mira* new species. Dorsal view of female (type). Sierra Maestra, Oriente, Cuba. (× 3.)

Fig. 9.—*Aglaopteryx mira* new species. Interocular portion of head as seen in cephalic aspect. Female (type). Sierra Maestra, Oriente, Cuba. (Greatly enlarged.)

Fig. 10.—*Aglaopteryx mira* new species. Distal margin of distal abdominal tergite (supra-anal plate) of female (type). Sierra Maestra, Oriente, Cuba. (Greatly enlarged.)

Fig. 11.—*Aglaopteryx occulta* new species. Dorsal view of male (type). Paget West, Bermuda. (× 5.)

Fig. 12.—*Aglaopteryx occulta* new species. Ventral view of distal abdominal sternite (subgenital plate) of male (type). Paget West, Bermuda. (Greatly enlarged.)

Fig. 13.—*Aglaopteryx occulta* new species. Caudal tarsus. Male (paratype). Paget West, Bermuda. (Greatly enlarged.)

Fig. 14.—*Aglaopteryx vegeta* new species. Ventral view of distal abdominal sternite (subgenital plate) of male (type). Pleasant Hill, Blue Mountains, Jamaica. (Greatly enlarged.)

## PLATE VIII

Fig. 1.—*Aglaopteryx vegeta* new species. Dorsal view of male (type). Pleasant Hill, Blue Mountains, Jamaica. (× 5.)

Fig. 2.—*Aglaopteryx vegeta* new species. Outline of three distal articles of palpus. Male (type). Pleasant Hill, Blue Mountains, Jamaica. (Greatly enlarged.)

Fig. 3.—*Aglaopteryx vegeta* new species. Outline of cercus. Male (type). Pleasant Hill, Blue Mountains, Jamaica. (Greatly enlarged.)

Fig. 4.—*Aglaopteryx vegeta* new species. Caudal tarsus. Male (type). Pleasant Hill, Blue Mountains, Jamaica. (Greatly enlarged.)

Fig. 5.—*Eudromiella arara* new species. Pronotum of male (type). Parintins, Amazonas, Brazil. (× 6.)

Fig. 6.—*Eudromiella arara* new species. Ventral view of distal abdominal sternite (subgenital plate) of male (type). Parintins, Amazonas, Brazil. (Greatly enlarged.)

Fig. 7.—*Eudromiella arara* new species. Distal margin of distal abdominal tergite (supra-anal plate) of male (type). Parintins, Amazonas, Brazil. (Greatly enlarged.)

Fig. 8.—*Sciablatta ega* new species. Dorsal view of male (type). Teffe, Amazonas, Brazil. (× 3.)

Fig. 9.—*Sciablatta ega* new species. Ventral view of distal abdominal sternite (subgenital plate) of male (type). Teffe, Amazonas, Brazil. (Greatly enlarged.)

Fig. 10.—*Sciablatta ega* new species. Apex of sinistral normally concealed genitalic appendage of male (type). Teffe, Amazonas, Brazil. (Greatly enlarged.)

Fig. 11.—*Sciablatta ega* new species. Palpus. Male (type). Teffe, Amazonas, Brazil. (Greatly enlarged.)

Fig. 12.—*Cariblatta advena* new species. Pronotum of male (type). Fond des Negres, Haiti, Hispaniola. (× 8.)

Fig. 13.—*Cariblatta advena* new species. Cephalic view of head. Male (type). Fond des Negres, Haiti, Hispaniola. (Greatly enlarged.)

Fig. 14.—*Cariblatta advena* new species. Ventral view of distal abdominal sternite (subgenital plate) of male (type). Fond des Negres, Haiti, Hispaniola. (Greatly enlarged.)

## PLATE IX

Fig. 1.—*Lauxoblatta magnifica* new species. Dorsal view of female (type). Caiary-Uaupes River, Amazonas, Brazil. (Natural size.)

Fig. 2.—*Lauxoblatta magnifica* new species. Cephalic view of head. Female (type). Caiary-Uaupes River, Amazonas, Brazil. (× 3.)

Fig. 3.—*Lauxoblatta magnifica* new species. Ventral view of distal abdominal sternite (subgenital plate) of female (type). Caiary-Uaupes River, Amazonas, Brazil. (Greatly enlarged.)

Fig. 4.—*Melestora andeana* new species. Pronotum of male (type). Huacapistana, Peru. (× 8.)

Fig. 5.—*Melestora andeana* new species. Palpus. Male (type). Huacapistana, Peru. (Greatly enlarged.)

Fig. 6.—*Melestora andeana* new species. Interocular space of head of male (type). Huacapistana, Peru. (Greatly enlarged.)

Fig. 7.—*Melestora andeana* new species. Tegmen. Male (type). Huacapistana, Peru. (× 4)

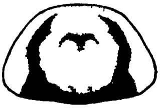
Fig. 8.—*Melestora andeana* new species. Ventral view of distal abdominal sternite (subgenital plate) of male (type). Huacapistana, Peru. (Greatly enlarged.)

Fig. 9.—*Chorisoneura yaguas* new species. Interocular space of head of male (type) Napo River, Peru. (Greatly enlarged )

Fig. 10.—*Chorisoneura yaguas* new species. Pronotum of male (type). Napo River, Peru. (× 8)

Fig. 11 —*Chorisoneura yaguas* new species. Tegmen. Male (type). Napo River, Peru. (× 5.)

Fig. 12.—*Chorisoneura yaguas* new species. Ventral view of distal abdominal sternite (subgenital plate) of male (type). Napo River, Peru. (Greatly enlarged.)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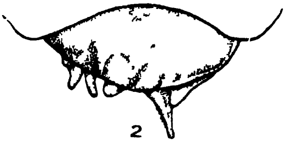
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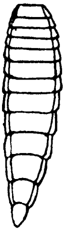
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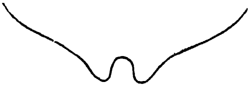
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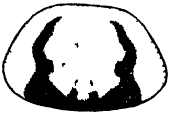
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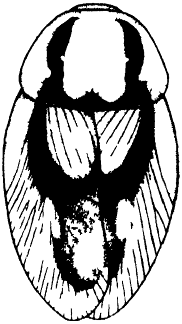

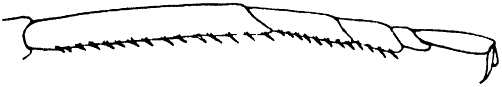
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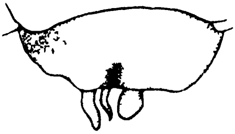

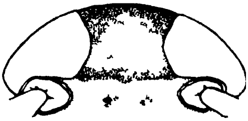

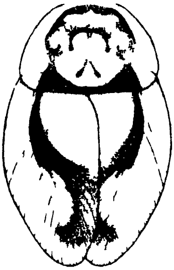
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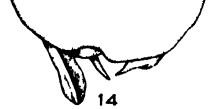
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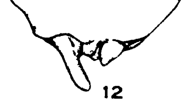
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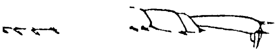
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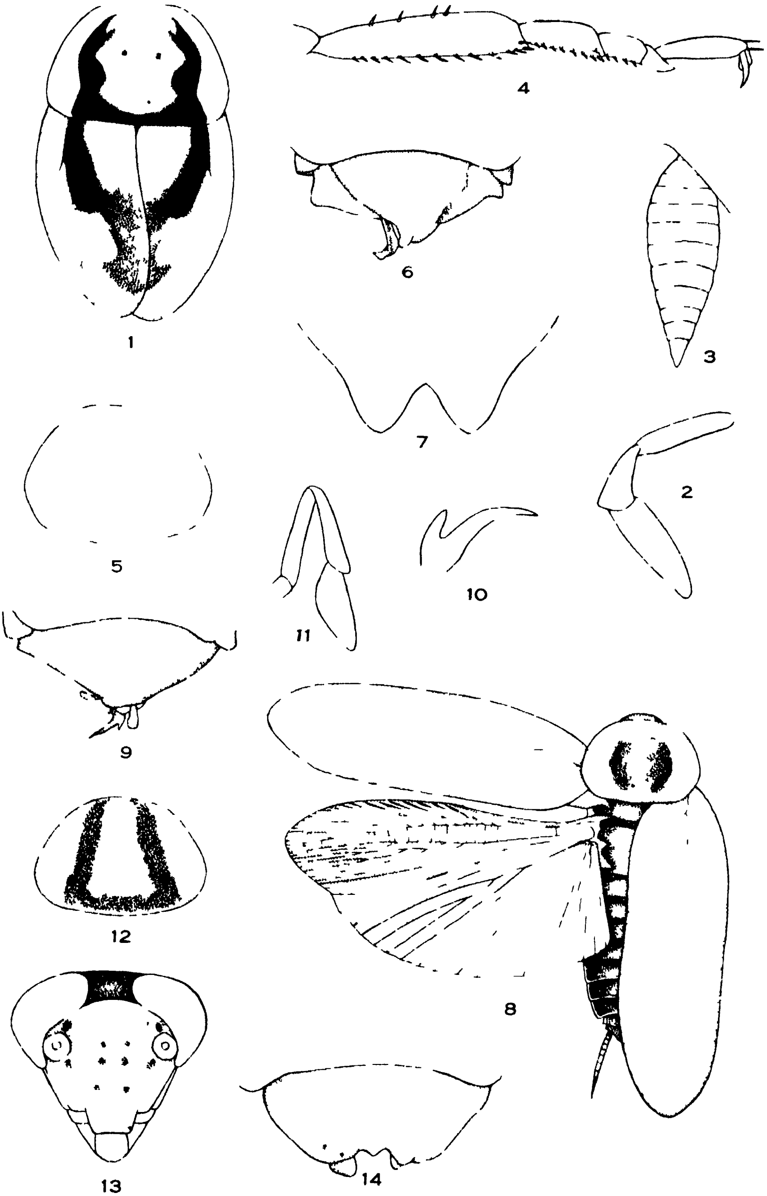
REHN—NEOTROPICAL BLATTIDAE



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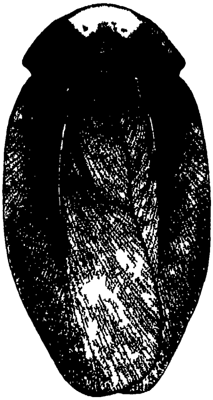

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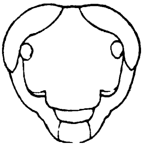

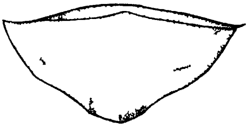

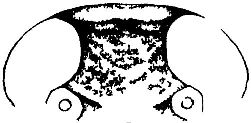

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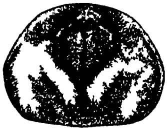

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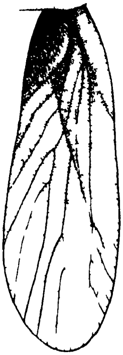

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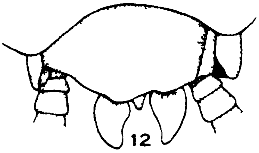

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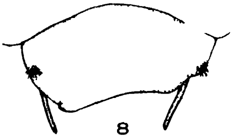

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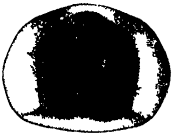

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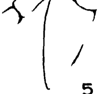

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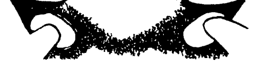

REHN—NEOTROPICAL BLATTIDAE

# A MONOGRAPHIC STUDY OF THE GENUS GERON MEIGEN AS IT OCCURS IN THE UNITED STATES[1]

## (DIPTERA: BOMBYLIIDAE)

BY REGINALD H. PAINTER[2]
*Kansas Agricultural Experiment Station, Manhattan, Kansas*

(Plates X, XI)

Among all the species of Bombyliidae the author, in the past, has had the most difficulty in identifying those belonging to the Genus *Geron*. Hence a considerable number of unidentified specimens has been gathered together. In studying these, new facts have been discovered which it is hoped will help in the determination of these species. Omitting the six species belonging in *Rhabdoselaphus*,[3] there are nine *Geron* species listed in Aldrich's catalogue.[4] Since then, Cresson[5] and Cole[6] have described three each from North America. The latter authors called attention to the usefulness of the male genitalia in identification and described two distinct types. One type is a digitate, the other a rosette-like arrangement. From a large series of specimens, the author has arrived at the conclusion that these types may be found in the same species. The reasons for this conclusion are as follows:

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[1] Contribution No. 389 from the Department of Entomology, Kansas State College.

[2] The author wishes to thank Mr. E. T. Cresson, Jr., of the Academy of Natural Science of Philadelphia, Dr. R. H. Beamer, of Kansas University, and also Dr. C. W. Johnson of the Boston Society of Natural History, for the loan of specimens in their care. He is especially indebted to Doctor Johnson and Mr. Banks for the comparison of specimens with Loew's types.

[3] Viz. *capax, cinctura, fasciola, sigma, trochilides, trochilus.*

[4] *A Catalogue of North American Diptera.* Smiths. Miscel. Coll., no. 46, p. 245, (1905). Bibliographical references to older paper are available in this work; the more recent ones will be found in the footnotes of the present paper.

[5] *Dipterological Notes and Descriptions.* Proc. Acad. Nat. Sci. Phila., LXXXI, pp. 171–194, (1919).

[6] *Expedition of the California Academy of Sciences to the Gulf of California in 1921: The Bombyliidae.* Proc. Cal. Acad. Sci., (4), XII, pp. 289–314, (1923).

1. The males in my collection may be arranged in paired groups, identical except for the type of genitalia and each paired group represented by one kind of female. This is especially true when a considerable number of specimens of one species are examined.
2. Specimens occur in which the condition is intermediate between the digitate and rosette types.
3. Specimens with rosette shaped genitalia may sometimes be boiled in caustic potash until they change into the digitate type.
4. Observations on living specimens show that the genitalia are quite mobile. Specimens of several species have been seen to change from one form to the other while dying in the cyanide bottle. On one occasion a male when placed in the bottle showed rosette form. Under a hand lens it was possible to see this change to digitate and back to rosette. The specimen was pinned and under the binocular microscope the genitalia were easily forced out into the digitate form again.

That this striking change in genitalia takes place in adult life is of considerable importance in the taxonomy of the group. Apparently it has never been recorded in any other insect but possibly may occur. In any one species the specimens showing the two types are in about equal numbers, especially where a large series of individuals are studied. The rosette condition may follow mating. In *arenicola* three pairs taken in copula by the author all show this type of genitalia. A pair of *subauratus* on the same pin in the Kansas University collection shows the male with the digitate condition. These, however, may not have been mating when taken.

A detailed study of the genitalia of one of the larger species, *grandis*, has been made. The six drawings (pl. X) show the homology of the parts in both rosette and digitate condition. A study of the other figures given will indicate that the male genitalia afford excellent characters for differentiation of species. These characters are complicated by the two conditions present. The remaining species are drawn in the digitate condition since the exact position of the part in the "rosette stage" varies greatly within a single species. All drawings are made with a micrometer grating on graph drawing paper. The majority of them were made using a 15x ocular and a 24 mm. objective. Illumination was provided by a Bausch and Lomb ribbon filament light. The nomenclature of parts follows that of Cole.[7]

Unless otherwise specified the type material is in the author's collection.

## BIOLOGY

As far as is known members of the genus *Geron* are parasitic on Lepidoptera. Two cases have been reported. Mik[8] reared *Geron gibbosus* Meig., a European species, from *Nephopteryx sublineatella* Strg. (Pyralidina) and *Fumea crasscorella* Brd. (Psychidae). In India Maxwell-Lefroy[9] reared *Geron argentifrons* Bru. from *Laspeyresia jaculatrix* Meyr. (Tortricoidea). There appears to be no evidence that these insects are hyperparasites as are some other members of the family Bombyliidae.

The adults are flower flies. *Grandis* and some other species are partial to the button bush, *Cephalanthus occidentalis*. Others frequent composites, especially sunflowers, where they are found in company with *Phthiria* and other Bombyliidae. Some species have the habit of hovering over a flower and bobbing up and down, while emitting a faint hum. Frequently *Geron* may be found resting like miniature robber flies on the tips of twigs and leaves near the flowers. Certain species are very abundant where they occur

## CLASSIFICATION

The characters of the genus are as follows: Radial sector of wings three branched; $R_{2+3}$ separating at an acute angle nearly opposite the tip of $R_1$. Anal cell closed a short distance from the edge of the wing; media two branched. Ambient vein incomplete ending at anal vein; axillary lobe and alula well developed; $R_5$ open.

### Subgenus **GERON**

1820. Meigen, Syst. Beschr. Eur. Zweifl., II, p. 223.

The characters of the subgenus are: Head, body and legs clothed with scales, tomentum and pile; occiput flattened; prothorax with a concave emargination dorsocephalad; all tibiae with spines; cell $R_4$ about as broad as long.

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[7] *A Study of the Terminal Abdominal Structures of Male Diptera.* Proc. Cal. Acad. Sci., (4), XVI, pp. 397–499, (1927).

[8] *Zur Biologie von Geron Gibbosus Meig.* Wien. Ent. Zeit., XV, p. 106, (1896).

[9] Indian Insect Life, Calcutta, p. 589, (1909).

GENOTYPE: *Bombylius gibbosus* Oliver (as *Geron hybridus* Meig.).[10]

The species of this subgenus are remarkably similar in general appearance and vesture. Hence certain characteristics are mentioned here instead of repeating in each specific description. The ground color is uniformly black, velvety on the dorsum, gray pollinose on the venter and pleura from which parts the gray extends up onto the edges of the dorsum for varying distances. A triple or double pollinose streak is present in most species, extending from the cervix up onto the mesonotum. The oral margin, legs, paraprocts, latero-caudal angles of abdominal tergites and caudal margins of the sternites may be yellowish or brown. The first pair of tibiae is always darker than the others. All of the species have the ventral and lateral pile and tomentum always silvery white. The pile and tomentum of the dorsum and about the ocellar tubercle are variable from white to golden brown in the different species. The color of the pile on the base of the costa has been found to be a convenient measure of the extension of this color; in the more golden species it is yellow. Except in *subauratus* and *digitaria* and a few other species the wings are uniformly pure hyaline. There is very little difference in the venation, especially in closely related species. The r–m cross vein sometimes varies a little in position with respect to the discal cell; the median cross vein differs a little in shape in the different species. The antennae are much the same shape in all species. They have been figured by Cresson.[11] The first two joints are clothed with stiff pile which is either black or white, occasionally intermixed as in *vitripennis*.

The genitalia of the males are usually exserted and furnish the best characters for separation of the species. The terminal abdominal segments of the female would probably furnish equally good characters but they are largely hidden. The two species which have been examined in regard to these structures show wide differences. Usually more visible structures are available and have been used. Of these the color and character of the tomentum on the front of the female are most useful. In some species the scales are all alike, broad and closely appressed. In others the center of the front is occupied with narrow, lanceolate, curved, scales very different from those along the orbits. In the former case the scales are always silvery; in the latter case those on the sides are silvery while those in the center may be silvery, yellow, or golden in the several species. The ground color of the oral margin, legs and margins of the ventral abdominal sclerites has been found most useful in associating males and females of the same species and differentiating them from others. In all cases the male genitalia have been the court of last resort in determining the status of a specimen or group of specimens. No new species have been described unless the male genitalia in the digitate condition were easily visible and the tomentum well preserved on at least some of the specimens. As a result a considerable number of specimens are on hand which have not been placed. Many of them represent undescribed species but are retained until more material is available.

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[10] The European species appear to need revision with a careful study of the genitalia.

[11] Ent. News, XXVI, p. 200, (1927).

### Subgenus **EMPIDIGERON** new subgenus

This subgenus differs from the typical *Geron* as follows: Head almost spherical, less flattened behind the eyes and less conically produced upward; prothorax more strongly developed. In male and usually also in the female no tomentum on head and usually none on the thorax in the typical species. No scales on body which is clothed sparsely with long hairs and short appressed hair-like tomentum. Legs with sparse scales, four anterior tibiae with few or no spines. Cell $R_4$ at least twice as long as broad. Male genitalia of different structure (pl. I, *snowi*) but exhibiting the same tendency to form two types, rosette and digitate. Under high magnification the short pile on the third antennal joint is much more prominent than in most species of the subgenus *Geron*.

GENOTYPE: *Geron* (*Empidigeron*) *snowi* n.sp.

Species of this subgenus show considerable variation in the color and length of the pile on the head and antennae; occasionally it is entirely absent. The males and females appear quite different in the vesture of the head. The male genitalia dry in a variety of shapes but when relaxed in caustic potash would probably furnish good characters. Other characters, however, are available and have been used in preference.

The key which follows includes the North American species which have been identified during this study. It does not include the following species of older authors—*senilis* Fabr., *rufipes* Macq., *holosericeus* Walker, and *insularis* Bigot. These are discussed at the end of the paper. Two forms described by Cresson[5] and three described by Cole[6] are also not included. *Nivea* Cresson, *niveoides* Cole, and *insularis* Cole are described from specimens with the rosette type of genitalia. In order to elucidate these species, it will be necessary to have a series containing both digitate and rosette types of genitalia and make direct comparisons with the types. Specimens which die with the genitalia in the rosette position rarely dry so that they have exactly the same appearance. This renders comparison difficult, if not impossible, from drawings or descriptions. *Alba* Cole is discussed under *versicolor* n.sp., to which species it appears to be related. *Robusta* Cresson, described as a variety of *digitaria*, is certainly a distinct species. It may be identical with the species described below as *versicolor*, but a direct comparison of a series which includes both males and females with the type will be necessary for absolute identification, since the type of *robusta* is a female.

*Key to the Species of Geron*

1. Vein $R_5$ from fork with $R_4$ to edge of wing about as long as the part of $R_{4+5}$ from r–m crossvein to fork. No broad scales on face and front (Subgenus *Empidigeron*)......21
   Vein $R_5$ from fork with $R_4$ to edge of wing never more than two-thirds as long as preceding section; broad scales on front (Subgenus *Geron*)..........................2
2. Pile on base of costa golden, pile on dorsum of abdomen and thorax black to golden..........................3
   Pile on base of costa silvery, pile on dorsum usually light yellow or silvery..........................5
3. Basistyli (♂) flat with oval unchitinized area; scales on middle femora (♂) brownish. Middle and hind femora (♀) brown to yellow; large species (5–7 mm.). *litoralis* n.sp.
   Basistyli (♂) not so; femora (♀) dark brown or black....4

4. Tibiae dark brown or black; wings faintly smoky (See also *nigripes* and *digitaria*)................*subauratus* Loew.
Middle and hind tibiae yellowish; wings hyaline. *vitripennis* Loew.
5. Middle and hind femora yellow; species 5 to 8 mm. long. *grandis* n.sp.
Femora black or dark brown.........................6
6. Legs black...................................7
Middle and hind tibiae yellow......................10
7. Pile above black; tomentum above lacking or almost so. *nigripes* n.sp.
Pile above yellow or white; tomentum on well preserved specimens abundant...........................8
8. Tomentum on dorsum golden; pile on antennae mostly black; wings faintly smoky........... *digitaria* Cress.
Tomentum on dorsum white or yellow; pile on antennae mostly white; wings hyaline........................9
9. Oral margin black; Eastern species .........*johnsoni* n.sp.
Oral margin yellowish; Western species......*parvidus* n.sp.
10. Oral margins whitish or yellowish ..................12
Oral margins black... ......... ...............11
11. Tomentum yellowish to white above; basistyli with two protuberances on each side .. ... .. ... *johnsoni* n.sp.
Tomentum golden above; basistyli flat with oval unchitinized space near center......................*versicolor* n.sp.
12. Males ........ ........................13
Females .. . ... ....... ... .................17
13. Basistyli with prominent ridges or protuberances when viewed from side...... .......................14
Basistyli not so.............................15
14. Basistyli at junction with hypandrium turned down to form a leaf-like projection.............. ... *winburni* n.sp.
Basistyli with two low subparallel ridges on each side; the center yellowish.......... ..............*argutus* n.sp.
15. Basistyli with slight central ridge..................16
Basistyli concave in center (western species)..*parvidus* n.sp.
16. Dististyli from sides slender, narrow ..........*albaria* n.sp.
Dististyli from sides subtriangular, broad... *arenicolus* n.sp.
17. Tomentum of front silvery.........................18
Tomentum of front golden or yellow..................19
18. Middle tibiae brown to yellowish, remainder of legs black; length 3 to 4 mm........................*argutus* n.sp.
Middle and hind tibiae yellow; length 4.5 to 6.5 mm. *albaria* n.sp.

19. Pile white to yellowish above ........................20
Pile golden above........................*winburni* n.sp.
20. Pollinose stripe on mesonotum extending most of the distance across the mesonotum; length 3 mm.......*parvidus* n.sp.
Pollinose stripe on anterior one-third only; length 5 to 7 mm. *arenicolus* n.sp.
21. First and second joints of antennae subequal..*aequalis* n.sp.
First joint about twice as long as second...............22
22. Pile on antennae largely black...................... .24
Pile on antennae white . .... ......................23
23. Abdominal venter largely yellowish......... *calvus* Loew.
Caudal margins of abdominal sternites only yellow. *aridus* n.sp.
24. Abdominal venter largely yellowish...........*calvus* Loew.
Caudal margins of abdominal sternite only yellow.......25
25. No pile on face.............................*nudus* n.sp.
Pile present on face.. ........................ ...........26
26. Legs black or dark brown, concolorous ....... *snowi* n.sp.
At least middle tibiae lighter than rest, yellowish.......27
27. Empodia present; all tibiae yellowish.. .......*aridus* n sp.
Empodia absent; middle tibiae yellowish.......*hybus* Coq.

1. **Geron litoralis** new species (Pl. X)

*Male.*—Ground color of body black, posterior borders of ventral abdominal segments narrowly bordered with yellow; yellowish pilose above, white beneath, dark golden tomentose above, silvery tomentose beneath. Wings hyaline, subcostal cell yellowish, radius-median cross vein opposite tip of costal cell; base of cell $R_4$ beyond apex of subcostal cell. Genitalia black, and black haired; a shield-shaped brown area on the united basistyli near the margin of the subgenital plate; between this spot and the division into the dististyli is a white oval unchitinized area. Length, 6.5 mm.

Head black, white pollinose, ridge between oral cavity and eyes yellow, white pollinose; antennae black, stiff hairs on the first two joints, brownish below on the first joint. Face yellowish pilose, a patch of yellow scales in the center; front and beside antennae, densely clothed with golden scales, lighter on the sides than in the middle; occiput with golden pile and tomentum, lighter to silvery beneath; hairs on ocellar tubercles brown and black.

Dorsum of mesothorax velvety black with bluish reflection; two gray pollinose stripes extend over the anterior end about two-thirds of the way to the center, these stripes are basally united; clothed on the dorsum with dark golden pile and tomentum; some of the pile on the center short and black. Scutellum like the dorsum of the thorax, entirely clothed with dark golden pile and tomentum; the pleura yellowish-white pilose and tomentose on a gray pollinose background; tomentum silvery on and near coxae.

Dorsum of abdomen velvety black with bluish reflection, sides and venter grayish pollinose. Margins of segments on the sides and below narrowly yellow, this margin lacking on the last three sternites. Pile above and below white, tomentum dark golden above, pale golden on the sides and silvery beneath. Stiff hairs on the subgenital plate, golden. Genitalia as described above.

Coxae and trochanters black, pollinose; femora blackish brown; tibiae light brown; tarsi brown to black; pile and scales yellow, dark golden on the femora above. Halteres and stalk yellow, pile of alula yellow.

*Female.*—Ground color black, gray pollinose on sides and venter with a three-pronged pollinose stripe on the thoracic dorsum. Front legs dark mahogany brown, tibiae towards base and inside light brown, hind coxae and trochanters black, remainder of four hind legs yellow, tarsi and knees blackish. Oral margin yellow. Lobes of 7th segment black; golden tomentose and pilose above on abdominal and thoracic dorsum, silvery beneath, the golden color extending onto the pleurae. Pile on antennae black above, whitish beneath, on thoracic dorsum sparse, black. The long pile on the last two ventral abdominal segments yellowish. Scales on front all similar in shape, golden in the center, silvery along the orbits and on a line from the orbits to the antennae. Tomentum of face silvery, pile yellowish. Pile of the occiput and front golden, becoming brownish near the ocelli. Wings hyaline, veins brown. Base of costa golden and black pilose.

*Holotype*—Male; Puerto Castilla, Honduras, May 2, 1926. Collected by the author.

*Allotype.*—Female; Puerto Castilla, Honduras, May 2, 1926.

*Paratypes.*—Five males; Puerto Castilla, Honduras, April 9, 20 and May 2. Two males; Port Lavaca, Texas, September 10. Three females; Kingsville, Texas, June 8 and 18, (F. M. Hull).

This species appears to be confined to the coastal plain of the Gulf of Mexico and Caribbean Sea. The smallest specimens are about five millimeters long. It is the most bright golden species the author has seen.

This species may be *rufipes* Macq. but differs from the description of that species in several points. Moreover, Macquart's poor description will fit at least two other North American species to say nothing of others probably present in Central America.

**2. Geron subauratus** Loew (Pl. X)

1863. *Geron subauratus* Loew, Berl. Ent. Zeit., VII, p. 304. (Cent., IV, 55).
1869. *Geron subauratus* Loew, Berl. Ent. Zeit., XIII, p. 173. (Cent., IX, 77, note).

Wings smoky hyaline, veins mostly blackish-brown. Legs dark brown of the same shade throughout. Tomentum on front in part golden in both male and female; antennae pile black; pile golden on wing base. Hypandrium sunken on sides, lightly chitinized; basistyli quadrate, brown with central yellow stripe; dististyli robust. Length, 3.5 to 5 mm.

*Male.*—Ground color black except whitish oral margins, white facial triangle, and sometimes narrow yellowish margins to sternites; legs entirely mahogany brown to black. Pile white; on antennae and ocellar tubercle black, on face yellowish in certain lights, dusky to golden on occiput above, thoracic and abdominal dorsum, on base of wing golden, on dististyli brownish golden to black, shining; the long terminal pile of hypandrium golden at base. Tomentum silvery below, deep golden above, in center of frontal triangle golden with sides silvery; on the legs silvery, yellowish on femora above. Wings smoky hyaline, iridescent, veins blackish brown, yellowish at base. Hypandrium incised on latero-distal margin where it is sunken and very lightly chitinized. Basistyli smooth, shining, flat quadrate, brown with central yellowish stripe from base to apex. Dististyli short, irregular, conical, mahogany brown. The stripe on basistyli is somewhat variable in width, especially at base.

*Female.*—Similar to male with usual sexual differences. Legs somewhat lighter brown, paraprocts brown. Tomentum on front sparse, rough and golden in center, silvery on orbits and beside antennae.

*Type.*—In Museum of Comparative Zoology, from Pennsylvania.

This species differs from most of the others except *digitaria* in having smoky hyaline wings. This fact must have impressed Loew, for he included the fact in his description and named the other North American species *vitripennis* and *albidipennis*. Earlier (1863) he had grouped several species as shown by his note, "Magnitudine valde variat; . . ."; later (1869), this statement was corrected.

*Range.*—MASSACHUSETTS: "Mass." 1♂, 1♀. Auburndale, June 22, 1905, (C. W. Johnson), 1♂. Nantucket, July 11, (Morse), 1♂. Woods Hole, July 25, (C. W. Johnson), 2♂, 1♀; July 24, 2♀. Sharon, Aug. 3, 1909, (C. W. Johnson), 1♂. Manomet, July 25, 1905, (C. W. Johnson), 1♀. Barnstable, July 5, 1904, (C. W. Johnson), 1♀.

RHODE ISLAND: Liverton, July 12, 1916, (C. W. Johnson), 1♂.

CONNECTICUT: Salem, July 12, 1914, (H. W. Foote), 1♂, 1♀, and July 22, 1914, 2♂.

NEW JERSEY: Riverton, June 4, (C. W. Johnson), 4♂, 4♀, and July 6, 2♂. Avalon, June 30, (C. W. Johnson), 1♂. Clementon, June 24, 1906, 1♂, 1♀; June 25, 1♂; July 7, 1892, 1♀; July 24, 1906, 1♀; Aug. 5, 1905, 1♀. Da Costa, July 14, (C. W. Johnson), 1♀. Jamesburg, June 4, 1914, (C. W. Johnson), 1♀. Delaware Water Gap, July 6, (C. W. Johnson), 1♀; July 12, (C. W. Johnson), 1♂. Atco, 1♀.

PENNSYLVANIA: Lehigh Gap, June 29, 1901, 1♂. Manayunk, 6♂, 5♀. Carpenter Station, Philadelphia, July 13, 1913, (E. G. Vanatta), 1♂.

MARYLAND: Linnieville, July 7, 1903, 1♀.

VIRGINIA: Wiehlie, June 22, 1913, (R. C. Shannon), 1♀.

Specimens are in collections of C. W. Johnson, Boston Society of Natural History, American Entomological Society, Kansas University, and of the author.

### 3. **Geron vitripennis** Loew (Pl. XI)

1869. *Geron vitripennis* Loew, Berl. Ent. Zeit., XIII, p. 173. (Cent., IX, 77).

Wings pure hyaline, veins yellowish, especially toward the base of wing. Legs mahogany brown, first tibiae somewhat lighter; second and third tibiae yellowish brown; tomentum of front yellowish to golden in part on both male and female; antennal pile black, sometimes whitish below; pile on base of costa white. Hypandrium sunken on sides, lightly chitinized, basistyli trapezoidal, chitinized with ridge down center, pile on dististyli brown. Length, 5 to 6 mm.

*Male.*—Ground color black except the whitish genae, and brownish lower part of face and legs. The middle tibiae usually lighter color than fore or hind pair. Pile white, on antennae and ocellar tubercle black, occiput, abdominal and thoracic dorsum yellowish, the long terminal pile of hypandrium yellow at base. Tomentum silvery below and on legs, sparse and golden above, yellow on front. Hypandrium incised on latero-distal margin where it is sunken and very lightly chitinized. Basistyli blackish, smooth, shining, trapezoidal with a ridge through the center. Dististyli brown, lanceolate.

*Female.*—Similar to male with usual sexual differences. Tomentum of front rough and golden in center, silvery on orbits and beside antennae. Pile on front golden; of face white; somewhat darker on dorsum than in male.

*Type.*—In the Museum of Comparative Zoology.

*Range.*—NEW JERSEY: Clementon, Sept. 5, 1909, 1♂; July 29, 2♂. Delaware Water Gap, July 12, (C. W. Johnson), 2♂; July 8, 1898, (C. W. Johnson), 1♀. Whitings, Aug. 5, 1920, (R. H. P.), 2♂, 1♀. Browns Mill, Aug. 17, 1925, (H. C. Hallock), 1♂. Quaker Bridge, Aug. 27, 1925, (H. C. Hallock), 3♀. Chatsworth, Aug. 14, 1925, (H. C. Hallock), 1♀.

CONNECTICUT. "Conn., Williston," 1♂.

VIRGINIA: Falls Church, Aug. 25, *Vernonia*, [N. Banks Collection], 1♂.

MISSOURI: Atherton, (C. F. Adams), July 2, 1♂; July 3, 2♂, 1♀; July 4, 1♂; Aug., 1♂.

ARKANSAS: Washington County, June 7, 1927, (D. G. Hall), 1♂.

TEXAS: Brownwood, Aug. 22, 1921, (R. H. P.), 1♂; Sept. 16, 1920, 1♀. Mason, Aug. 26, 1924, (R. H. P.), 1♂. Austin, Oct. 20, 1923, 1♀.

The western specimens differ from the eastern ones only in having the margins of the ventral abdominal sclerites yellowish instead of dark. This is usually an important character but the genitalia and other characters appear identical. Western records based on females only, should be accepted with caution.

### 4. **Geron grandis** new species (Pl. X)

*Male.*—Ground color of body black, of abdomen yellowish beneath, lower parts whitish pollinose, long silvery pilose. Genitalia dark brown; area on the united basistyli distal to the subgenital plates forming a yellowish, weakly chitinized more or less triangular space the base of which is along the apex of the subgenital plate. Wings hyaline, base of cell $R_4$ beyond apex of subcostal cell; the fork at its base a right angle. Length excluding the antennae, 7 mm.

Head black, white pollinose, lateral oral margins yellow. Head with silvery pile and curly tomentum. A few stiff brownish hairs on the ocellar tubercle. Face and front white pollinose, front silvery tomentose, sides of face silvery pilose, the bare area beneath the antennae nearly rectangular. Sides of oral margin yellow, palpi black haired. Antennae black, thinly white pollinose, first and second joints with stiff white hairs below and stiff white and brown hairs above, the brown hairs predominate all the way round on the second joint, first joint two and one-half times the length of second, third joint spindle-shaped, five and one-half times the length of the second joint.

Mesothorax velvety black above, black but white pollinose on the sides and a strip above the root of the wings; median anterior, double, gray stripe scarcely extending onto the dorsum; entirely covered with long silvery pile, tomentum somewhat curly on the pleurae; metapleura bare of pile and tomentum. Scutellum velvety black, long white pilose. Ground color of abdomen velvety black above, pollinose below, yellowish and white curving up along the sides of the posterior segments, entirely long silvery pilose, curly yellow tomentose above and silvery tomentose beneath and on the sides. Genitalia whitish pilose, mahogany brown in ground color and with yellow unchitinized triangular area on united basistyli.

Legs with white scales and hairs and black spines; coxae and trochanter black, white pollinose. Femora and tibiae light yellowish brown, front tibiae darker, front femora and all tarsi dark brown. Apex of front femora without spines. Wings hyaline, veins yellow to light brown, subcostal cell clear, radius-median cross vein beyond middle of discal cell; first anal closed and petiolate, $R_4$ branching from $R_5$ beyond the apex of subcostal cell. Vein which closes discal cell oblique, sinuous. Halteres and stalk yellowish white.

*Female.*—Ground color of body black, except on dorsum of mesothorax, scutellum and abdomen white pollinose; yellowish beneath abdomen, long silvery pilose throughout, pale golden tomentose above, silvery tomentose on sides and beneath. Wings hyaline, base of cell $R_4$ beyond apex of subcostal cell, fork at its base a right angle.

Head, antennae, proboscis and palpi black; palpi black haired; ridge between oral cavity and eye yellow. Head white pollinose, silvery tomentose and pilose. Behind the vertex and the center of the front light golden tomentose. Sides of the front and between the antennae and the eyes with appressed silvery scales, sparse silvery pile on the sides of the face. Sparse pile on front and ocellar tubercle pale yellowish. Antennae brownish black; first and second joints with stiff white and brown hairs above, the brown hairs predominate, both joints more or less bare on the inner surface.

Dorsum of mesothorax velvety brownish black in the center, the sides white pollinose, fading into gray and brown on the sides of the mesonotum. A gray pollinose stripe extends over the anterior end of the mesothorax as far as the center, the stripe is broader at the base where it is silvery tomentose. Remainder of dorsum pale golden tomentose. Entire thorax white pilose, silvery tomentose on the sides and front. Metapleurae bare of pile and tomentum. Scutellum velvety brownish black, gray pollinose around the edges, white pilose, pale golden tomentose in the center, silvery around the edges.

Abdomen brownish black and velvety on the dorsum, yellowish below, especially along the edges of the segments, grayish pollinose along the sides and venter; entire abdomen white pilose, pale golden tomentose above and silvery tomentose beneath; posterior edge of ninth tergite and entire paraprocts yellowish.

Legs with white hairs and scales and black spines; tarsi with short stiff black hairs; coxae and trochanter black, white pollinose; femora and tibiae light yellowish brown, front femora and tibiae darker, tarsi dark brown to black. Wings as in the male. Length, 5 to 8 mm.

*Holotype.*—Male; Brownwood, Texas, August 14, 1921. (R. H. Painter).

*Allotype.*—Female; Brownwood, Texas, September 5, 1921. (R. H. Painter).

*Paratypes.*—Brownwood, Texas, August 9, 1♀; August 17, 1♂; August 22, 2♂, 2♀; August 23, 2♀; August 24, 2♂, 3♀; August 30, 2♂, 5♀; September 5, 2♀; September 10, 1♀; September 22, 1♂, 2♀; and September 23, 1♀; Austin, Texas, September 23, 1922, 14♂, 1♀; San Saba, Texas, August 25, 1921, 6♂, 1♀; Roosevelt, Texas, August 27, 1924, 1♂, 1♀; Brady, Texas, August 25, 1924, 1♂, 1♀, (R. H. Painter). Santa Rita Mountains, Arizona, August 9, 1930, (T. F. Winburn and R. H. Painter), 1♂, 2♀; 20 mi. w. of Hope, New Mexico, August 6, 1931, (R. H. Painter), 1♀. In the Kansas University Collection are 2♂, 1♀, San Bernardino Ranch, Cochise County, Arizona, 3750 ft., August, (F. H. Snow); 1♀, Douglas, Arizona, (F. H. Snow; 172).

Unchitinized triangle of genitalia varies from yellow to light brown but is always situated in a depression. A tiny patch of gold scales is sometimes present on apex of frontal triangle. Front femora range from dark brown to yellow with tips brown. Center of frontal area ranges from golden to very pale yellow tomentose but front always shows two kinds of scales, slender tomentum in center and broad appressed scales on the sides. It was on the seventy odd specimens of this species and the sixty odd specimens of *albaria* that the relationships of the forms of male genitalia were first worked out.

### 5. **Geron nigripes** new species (Pl. XI)

Wings hyaline. Tomentum silvery on front in male, golden in female. Pile on antennae and much of dorsum black to brown, on base of costa white. Legs black, middle tibiae of female sometimes a little lighter than others. Basistyli black, flat. Hypandrium sunken, the margins distinct, at juncture with basistyli turned up into a spine-like process. The minute hair on the third antennal joint is a little longer here than in other species. Length, 3 to 3.5 mm.

*Male.*—Ground color shining black, oral margin whitish. Pile above long, black and brown, below white. Tomentum lacking above, golden on sides, spare and white below. Wings hyaline, veins brown, knot on M darker than nearby vein. Hypandrium sunken, unchitinized, the margins distinct, at juncture with basistyli turned up into a spinose process. Basistyli black, flat. Dististyli black, oval, pile yellowish.

*Female.*—Similar to male. Tomentum of front golden with narrow curved scales, on lower orbits and above antennae with broad silvery scales. Pile on abdomen above golden, on thoracic dorsum brown, on venter white. Tomentum golden on dorsal half of body, white on ventral.

*Holotype.*—Male; Monrovia Canyon, California, August 3, 1930, (T. F. Winburn and R. H. Painter), [Author's Collection].

*Allotype.*—Female; same data as type.

*Paratypes.*—7♂, 5♀; same data as type. 1♂, 1♀, Idyllwild Road, California, July 22, 1930; 2♂, Cajon, California, July 24, 1930, (T. F. Winburn and R. H. Painter). 1♂, 1♀, Mosier, Oregon, 600 ft. elev., July 17, 1929, (H. A. Scullen, on *Eriogonium elatum*), [Oregon Agricultural College Collection]. Two other females, same data, are in too poor condition to be named paratypes but are probably the same species.

6. **Geron digitaria** Cresson (Pl. XI)

1919. *Geron digitaria* Cresson, Proc. Acad. Nat. Sci. Phila., LXXI, p. 184.

Cresson's description is as follows:

> ♂. Black; oral margin, halteres including stalk, squamae, bases of wings, pale yellowish. Tibiae brownish. Opaque. Frons, face, occiput below, lateral margins of mesonotum, pleura, venter, femora, gray to white pruinose. All pile silvery white, becoming slightly dusky on dorsum where it is sparse. Dorsum also sparsely golden lanuginous, becoming silvery below. First antennal joint black, pilose. Third longer than first two together, slender, conical. Ultimate section of fourth vein longer than preceding. Claspers of hypopygium finger-like. Length, 5 mm.
>
> *Type.*—♂; Highrolls, New Mexico, June 11, 1902, (Viereck), [A.N.S.P. No. 6207].[12]

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[12] This number should be 6263. The number originally given is incorrect. [Ed.]

The type has not been examined, but two males, before me, taken at the same time and place agree exactly with the description and are evidently the same species. The figures of the genitalia are taken from one of these males. That figured by Cole[13] is a different species and is unknown to the writer.

The female may be described as follows: Similar to male with the usual sexual differences. Tomentum of front rough and golden in center, broadly silvery about orbits, above and beside antennae. Pile of front golden, of face white; on antennae largely black but with a few long white ones laterally. The dorsum of thorax and abdomen is bright golden tomentose. The pile on the costal margin of wing is white. The wings of both sexes are light brownish, being similar to *subauratus* in this respect.

*Allotype:* Southern Arizona, (F. H. Snow), August 1902, in the University of Kansas Museum. In addition I have: thirty-four ♀ with same data; also from Arizona, August, 1 ♀ ; Bill Williams Fork, Arizona, August, (F. W. Snow), 1 ♀ ; Oak Creek Canyon, Arizona, 6000 ft., August, (F. H. Snow), 2 ♀ ; Jemez Springs Mts., New Mexico, June 1 ♀ ; Jemez Mts., New Mexico, August 15, 1914, 1 ♀ ; Cloudcroft, New Mexico, Aug. 7, 1931, (R. H. Painter), 7 ♀ ; Tajique, New Mexico, August 12, 13, 1931, 4 ♀.

Seventy-seven females from the same localities in the University of Kansas collection are apparently this species.

The forty-eight males examined are from the following localities: Highrolls, New Mexico, July 11, 1902; Otero County, New Mexico, June 21, (E. M. Painter and R. H. Painter); Jemez Springs Mts., New Mexico, June; Southern Arizona, (F. H. Snow), August 1902; Magdalena, New Mexico, August 1894, (Snow); Oak Creek Canyon, Arizona, 6000 ft., August, (F. H. Snow); Cloudcroft, New Mexico, August 7, 1931; Tajique, New Mexico, August 12, 1931.

Extra cross veins are present on wings of several specimens. Similar anomalies are reported in specimens of a species by Williston.[14] The genitalia are mahogany brown with central yellow stripe and sunken hypandria sides.

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[13] Proc. Cal. Acad. Sci., (4), XII, p. 293, (1923).

[14] Ann. Ent. Soc. Am., x, p. 25, (1917).

7. **Geron johnsoni** new species (Pl. XI).

Wings hyaline; tomentum on front silvery in male; antenna pile white on first joint and black on second; white on base of costa. Femora and tibiae black to very dark brown, middle tibia somewhat lighter. Basistyli heavily chitinized, flat but with two protuberances on each side. Hypandrium sunken, unchitinized, margins distinct.

*Male.*—Ground color black as are the oral margins and legs, middle tibiae and knees somewhat browner; abdominal sternites narrowly margined with brown. Pile above white, on antennae and base of costa white, on second joint of antennae black. Tomentum above very light yellowish, on front and venter silvery. Wings hyaline with a slight tendency toward smokiness; veins light brown, knot on M darker than nearby vein. Hypandrium unchitinized, sunken, with distinct margins. Basistyli black, in the center brownish, flat with a protuberance and a club-shaped tubercle as seen from the side. Diststyli slender, dark brown, pile light yellowish. Length, 4 mm.

*Type.*—Male; Horseneck Beach, Massachusetts, July 30, 1913, (C. W. Johnson), in the collection of the Boston Society of Natural History.

*Paratype.*—Male; Provincetown, Massachusetts, September 8, 1907, (E. P. Morse), in the same collection. This species is named in honor of Mr. Charles W. Johnson.

8. **Geron parvidus** new species (Pl. XI).

Wings light smoky hyaline, tomentum on front silvery in male, golden in center in female; pile on antennae and base of costa white. Legs black, middle tibiae yellowish in male, in female all are lighter than in male. Basistyli black, concave, lateral margins prominent. Hypandrium sunken, unchitinized. Length, 3 mm.

*Male.*—Ground color brownish black, oral margin whitish, middle tibiae yellowish; lateral margins of abdominal tergites and caudal margins of sternites yellowish Pile above whitish yellow, below white. Tomentum yellow above, white below. Wings smoky hyaline, lighter than in *subauratus*, veins brown, the knot on M darker than nearby vein. Hypandrium sunken, unchitinized, the margins distinct. Basistyli black, concave, lateral margins prominent. Diststyli subtriangular, black, the pile yellow.

*Female.*—Similar to male. Tomentum of front golden, the scales slender, curved, at base of antennae and part of the way up the orbits, silvery, the scales broad. All tibiae lighter in color than in male; yellow margins of sternites broader. Pollinose stripe on mesonotum indistinct but extending most of the way across the dorsum.

*Holotype.*—Male; Los Banos, California, July 28, 1930, (T. F. Winburn and R. H. Painter).

*Allotype.*—Female; same data as type.

*Paratypes.*—2♂, 2♀, same data as type; 1♀, Cajon, California, July 24, 1930, (T. F. Winburn and R. H. Painter).

### 9. **Geron versicolor** new species (Pl. X, XI)

Wings hyaline; tomentum on front silvery in male; antennal pile white; on base of costa white; femora and first tibiae black, second and third tibiae light brown. Basistyli black, with yellow unchitinized triangular area. Hypandrium chitinized especially ventrally, margins rounded.

*Male.*—Ground color black including oral margins and entire abdominal tergites; anterior tibiae black, second and third light brown. Pile above white, somewhat yellowish on the mid-dorsum, especially individual hairs; white on first antennal joint and base of costa. Tomentum golden on dorsum and on a dorsal stripe on front femora; the golden tomentum of the abdomen occupies about two-thirds of the dorsum. Wings hyaline; veins yellow, knot on M darker than nearby vein. Hypandrium chitinized ventrally with rounded margins, a narrow dorsal stripe lightly chitinized. Basistyli black on sides, light brown in center, with yellow triangle at apex, the base of this triangle is along the apical margin. Dististyli broad, from the side subtriangular, blackish pilose.

*Female.*—Similar to male; tomentum of front and occiput golden in the center, the pile white; tomentum silvery along sides and beside antennae, the central tomentum consists of curved lanceolate scales, that along the orbits of broad flat ones; pile above as in male, perhaps a little more yellowish, tomentum bright golden above; the stripe on the mesonotum extends about one-fourth of the way across the dorsum; oral margin sometimes yellowish.

*Type.*—Male; Manhattan, Kansas, September 26, 1929, (R. H. Painter).

*Allotype.*—Female; Manhattan, Kansas, September 15, 1929, (R. H. Painter; collected on *Helianthus*).

*Paratypes.*—2♂, 2♀, Manhattan, Kansas, August 4, 18, September 6, 15, (R. H. Painter). Cisco, Texas, August 14, 1930, (T. F. Winburn and R. H. Painter), 5♂, 8♀. Brownwood, Texas, June 7 and 8, (R. H. Painter), 3♂, 4♀; August 8, 1924, 2♂, 2♀; September 4, 1923, 1♂, 1♀. Brady, Texas, August 25, 1924, (R. H. P.), 1♂. Mason, Texas, August 26, 1924, 2♂, 6♀. Austin, Texas, August 17, 1922, 1♀. Junction, Texas, August 26, 1924, 1♂, 2♀; August 9, 1927, (R. H. Painter), 1♂. Wilcox, Arizona, August 11, 1930, (T. F. Winburn and R. H. Painter), 1♂. Manahawkin, New Jersey, August 11, 1910, 1♂. Estancia, New Mexico, August 12, 1931, 22♂, 8♀, (R. H. Painter). Wichita National Park, Oklahoma, July 14, 1931, 1♂, 1♀, (R. H. Painter).

This appears to be the most variable species studied. The variations occur in specimens taken at the same place and time. The tomentum of the front of the female and the dorsum of both sexes vary from white to golden. The male from Arizona is the lightest, the one from New Jersey the darkest. The drawings were made from the latter. There is little variation in the genitalia except in the extent of the yellow on the basistyli. The ventral lobes of the seventh abdominal segments in the female are always dark. There is a faint tinge of yellow in the oral margin of some of the females. The amount of yellow on the ventral abdominal sclerites is variable; in the Texas specimens it is usually more extended than in the others.

The females of this species are distinguished from those of *albaria* by the shape of the scales on the center of the front; lanceolate and curved in the former, broad and flat in the latter. From the females of *arenicolus* they are distinguishable with difficulty, in that *versicolor* usually has darker golden tomentum and less extensive yellow margins to the abdominal sclerites. The genitalia of this species are very similar to that of *alba* Cole[15] in the latter species, however, the legs are entirely black and the vesture entirely silvery.

### 10. **Geron winburni** new species (Pl. XI)

Wings hyaline; tomentum on front silvery in males; golden in center in female; pile of antennae and base of costa white, a few black on second joint; femora black, anterior tibiae black, two and three yellow. Basistyli brownish, lighter in center, sunken, a prominent flat tubercle on each side, margins prominent. Hypandrium sunken, unchitinized, the margins sharp. Length, 4 to 6.5 mm.

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[15] See footnote 6.

*Male.*—Ground color black, oral margin whitish. Pile white; yellowish above, golden on oral tubercle; white on first antennal joint, most of second, and on base of costa. Tomentum white, yellowish on dorsal third of abdomen, silvery on front. Wings hyaline, veins yellowish, the knot on M the same color as the nearby veins. Hypandrium unchitinized, sunken, ventral margins distinct, at the junction with basistyli turned down to form a leaf-like tubercle. Basistyli brownish black, sunken, the margins black, irregular. Dististyli dark brown, slender, pile white.

*Female.*—Similar to male. Tomentum of front composed of narrow curved scales, golden in center, silvery on orbits; pile golden, on ocellar tubercle brown. Pile above bright yellow, brownish on thoracic dorsum. Tomentum golden on thoracic dorsum and dorsal two-thirds of abdomen, white below. Ventrolateral margins of tergites sometimes narrowly margined with yellow. Anterior tibiae yellow on basal third.

*Holotype.*—Male; Los Banos, California, July 28, 1930, (T. F. Winburn and R. H. Painter).

*Allotype.*—Female; same data as type.

*Paratypes.*—4♂, 5♀; same data as type.

This species is named in honor of my companion on a recent collecting trip through the Southwest, Mr. T. F. Winburn.

11. **Geron argutus** new species (Pl. XI)

Wings hyaline; tomentum on front silvery white; pile on antennae and base of costa white; legs black to dark brown, lighter in female; basistyli concave, light brown, sharply margined by a black ridge which runs diagonally across the disto-lateral angles, a second similar ridge runs subparallel and proximal to the first. Hypandrium sunken and unchitinized on the sides, the margins sharp. Length, 3 to 4 mm.

*Male.*—Ground color black except yellowish oral margins and narrow posterior margins of first three abdominal sternites. Pile and tomentum silvery white, the latter with slight yellowish tinge on dorsum of abdomen. Wings hyaline, veins brownish, the swelling on base of M the same color as nearby veins. Hypandrium unchitinized, sunken on sides, ventral margins sharp. Basistyli concave, light brown, sharply margined by a black ridge which runs diagonally across the disto-lateral angles, a second similar ridge runs subparallel and proximal to the first. Dististyli brown, slender, tips rounded, pile white. Length, 3 mm.

*Female.*—Similar to male; tomentum of front silvery with flat scales. Tomentum pale yellowish above. Tibiae especially the middle pair lighter than remainder of legs, the middle tibiae yellowish in some specimens. Length, 4 mm.

*Holotype.*—Male; Medora, Kansas, sand dunes, July 3, (R. H. Painter).

*Allotype.*—Female; Medora, Kansas, sand dunes, July 3, (R. H. Painter).

*Paratypes.*—Medora, Kansas, sand dunes, July 3, 5♂, 4♀. Port Lavaca, Texas, July 11, 27, August 4, September 10, (R. H. Painter), 4♂, 4♀. Taos County, New Mexico, 6000 ft., June 27, 1929, (E. M. Painter and R. H. Painter).

Other specimens: 1♂, 3♀, Baker, Oregon, 3900 ft., August 3, 1929. 1♀, 5♂, 10 miles south of Baker, Oregon, 3700 ft., August 10, 1929. 4♂, 1♀, 14 miles east of Mitchell, Oregon, 3750 ft., August 13, 1929, taken on *Chrysothamnus* spp. 4♂, Hereford, Oregon, 3660 ft., August 10, 1929, taken on *Heliotus alba.* 1♂, 36 miles east of Baker, Oregon, 2450 ft., July 31, 1929, taken on *Eriogonum elatum.* These were all collected by Mr. H. A. Scullen, and appear to belong to the same species. The vesture is not well preserved and they are therefore not designated as paratypes.

12. **Geron albaria** new species (Pl. XI)

Wings hyaline; tomentum on front silvery in both sexes; antennal pile white; white on base of costa. Femora black, first tibiae light brown, two and three yellowish. Basistyli heavily chitinized with slight central ridge and ventro-lateral protuberances; dark brown, slender. Hypandrium unchitinized laterally, the margins sharp. Length, 4.5 to 6.5 mm.

*Male.*—Ground color black; oral margin, lateral and ventral margins of abdominal tergites and distal margins of sternites yellowish white; anterior tibiae brown, second and third tibiae and metatarsi yellow. Pile above grayish white; white on antennae and base of costa. Tomentum silvery, light yellowish on thoracic dorsum and along center of abdomen. Wings hyaline, veins yellow, the knot on M the same color as the vein nearby. Hypandrium unchitinized, laterally and deeply sunken, the ventral margins sharp Basistyli brown with slight central ridge and a protuberance on each side near the middle forming a basin on each side behind them. Dististyli of the same color, slender, clothed with white pile. Length, 6 mm.

*Female.*—Similar to male; tomentum on front silvery, a little denser near the eye; scales all alike, broad, flat, and appressed. Tomentum above light yellow extending across the entire dorsum of the abdomen; the stripe on the mesonotum runs about three-fourths the way across center, the margins indistinct. Length, 5 mm.

*Holotype.*—Male; Brownwood, Texas, July 18, 1921, (R. H. Painter).

*Allotype.*—Female; Brownwood, Texas, July 23, 1921, (R. H. Painter).

*Paratypes.*—Brownwood, Texas, July 16, 1♂, July 18, 1♀, August 7, 1♀, August 17, 1♂, 3♀, August 22, 5♂, 2♀, August 23, 1♀, August 24, 2♀, August 30, 1♂, 2♀, September 4, 1♂, September 10, 1♀, (R. H. Painter). Harlingen, Texas, July 22, 1921, (F. M. Hull), 7♂, 7♀. Kingsville, Texas, June 7, 1♂, July 17, 1921, (F. M. Hull), 4♂, 6♀. August 9, 1921, 1♂. Austin, Texas, October 20, 1927, 1♀, November 5, 1921, 1♀. Port Lavaca. Texas, July 11, 1925, 1♀. Junction, Texas, August 15, 1927, 1♂, 1♀, August 26, 1924, 1♀. Ranger, Texas, August 18, 1927, 1♀. Sonora, Texas, August 27, 1924, 1♀. Abilene, Texas, September 15, 1921, 1♀, (R. H. Painter). Findley, Texas, August 11, 1930, (T. F. Winburn and R. H. Painter), 1♂. Bill Williams Fork, Arizona, [University of Arkansas Collection], 1♂. Morton County, Kansas, 3200 ft., (F. W. Snow), [University of Kansas Collection], 1♂. "Tex." 27, [American Entomological Society Collection], 2♀. Morton County, Kansas, 3200 ft., (F. W. Snow), June, 1909, [University of Kansas Collection], 1♀. "K.F.," Texas, August 12, 1918, (S. M. Dohanian), [C. W. Johnson Collection], 1♀.

### 13. **Geron arenicolus** new species (Pl. X, XI)

Wings hyaline; tomentum on front silvery in male, golden in center in female; pile on antennae and base of costa white. Femora black; anterior tibiae black, two and three yellow. Basistyli black, subtriangular, flat, with slight central ridge and prominent margins, heavily chitinized. Hypandrium sunken, the margins sharp, unchitinized. Length, 5 to 7 mm.

*Male.*—Ground color black including oral margin, femora, and front tibiae; lateral margins of abdominal tergites and caudal margins of sternites yellowish, very narrow in eastern specimens; pile above white likewise on first joint of antennae and base of costa. Tomentum light yellowish to golden above along dorsal one-third to one-half of abdomen; silvery on front. Wings hyaline, veins yellow, the knot on M about the same color as the nearby vein. Hypandrium unchitinized, sunken, this concave area running up into the diststyli, ventral margins sharp. Basistyli black, flat, with slight central ridge and prominent lateral margins; somewhat narrowed toward the apex. Diststyli black, subtriangular from the sides, the margins more prominent than the center; pile brownish.

*Female.*—Similar to male, tomentum of front and occiput golden yellow with curved lanceolate scales, the orbital margins broadly banded with silver scales; pile above white, yellow to golden on scutellum and occipital triangle; stripe on the mesonotum rather indistinct extending about one-third the way across center.

*Holotype.*—Male; Dickinson County, Kansas, September 24, 1929, (R. H. Painter; from the sand dunes near Abilene).

*Allotype.*—Female; same data as type.

*Paratypes.*—2♀, same data as type; 2♂, 4♀, and 3 pairs taken in copula, Medora, Kansas, sand dunes, September 2, 22, 23, (R. H. Painter), [all in my own collection]. 2♂, 1♀, Halsey, Nebraska, August 11, 15, 1925, (R. W. Dawson) and 5♂, 5♀, Scott County, Minnesota, sand dunes, August 25, 1922, (A. A. Nichol), [Minnesota University Collection]. 5♂, 2♀, Nantucket, Massachusetts, August 9, 1918, August 7, 1911, (C. W. Johnson); 1♂, 3♀, Horseneck Beach, Massachusetts, August 30, 1915, (C. W. Johnson); 2♀, Edgartown, Massachusetts, August 22, 1912, (C. W. Johnson), [all in the collections of C. W. Johnson and Boston Society of Natural History].

The type male was one of the specimens observed in the process of changing the form of genitalia from the rosette to digitate and back again. After being pinned the genitalia were again changed back to digitate type. Most of the males taken show the rosette type of genitalia including the three pairs taken in copulation.

The females are separated with difficulty from those of *versicolor* by having the tomentum usually less golden, and the abdominal segments with narrower marginal ground color and a yellow triangle usually present on the face. The genitalia of the males of the two species are quite different. This species appears to be largely confined to sandy regions.

### 14. **Geron (Empidigeron) aequalis** new species

*Female.*—Ground color black, middle and posterior tibia, and caudal margins of abdominal sternites brown; gray pollinose except on dorsum of thorax and abdomen and third antennal joint; central stripe on metanotum gray pollinose. Pile short, white, a few black hairs near ocelli and apex of abdomen. Tiny black pile on center of metanotum. Pile on antennae white, longer ones about as long as second antennal joint; on oral margin short, white. Tomentum white below, yellowish above. Front with appressed cuneate tomentum and short pile; face bare. Wings hyaline, last segment of vein $R_5$ somewhat shorter than preceding segment. Empodium absent. Antennae, first joint 0.09 mm, second joint 0.07 mm, and third joint 0.42 mm, long. Length, 5 mm.

*Holotype.*—Female; La Quinta, California, October, 1914, "155," in the collection of American Entomological Society. Type no. 6496.

This is the only *Geron* I have seen in which the second antennal joint is almost as long as the first. In several characters this species approaches the subgenus *Geron* as *nigripes* approaches the subgenus *Empidigeron.*

### 15. **Geron (Empidigeron) calvus** Loew

1863. *Geron calvus* Loew, Berl. Ent. Zeit., VII, p. 303. (Cent., IV, 53). ♀.

1896. *Geron macropterus* Loew, Berl. Ent. Zeit., XIII, p. 172. (Cent., IX, 76). ♂.

*Male.*—Ground color brownish black, abdominal venter and legs yellowish, head, venter and sides gray pollinose which extends up on the dorsum of the thorax as a midline and as a border to the transverse suture. Pile white, golden on abdominal dorsum, blackish on antennae, about genitalia, center of thoracic dorsum, and near ocelli; a sparse inverted V-shaped mystax of about a dozen short hairs below the antennae. A sparse tomentum of narrow cuneate scales white below, golden above, lacking on head. Wings light smoky hyaline. Empodia present. Antennae, first joint 0.12 mm, second joint 0.07 mm, third joint 0.48 mm, long; pile about as long as the second joint.

*Female.*—Similar to male, somewhat lighter in ground color and areas of black pile less extensive. Pile on front sparse, white, pile on antennae shorter than in male, sometimes partly white. Length, 4 to 6 mm.

*Type.*—In Museum of Comparative Zoology.

Redescribed from a male, Cove Mountain, Pennsylvania, August 3, 1919, (E. Daecke), and a female, Delaware Water Gap, New Jersey, July 12, [U. of K. lot 775]. Five other specimens were examined from Delaware Water Gap, New Jersey, Mt. Pleasant, Pennsylvania, August 19, 1914, Inglenook, Pennsylvania, July 4, 1911, (E. Daecke), and Ithaca, New York, July 29, 1928, (H. A. Scullen).

### 16. **Geron (Empidigeron) aridus** new species

*Male.*—Ground color brownish black, tibiae, metatarsi and caudal margins of abdominal sternites yellowish; gray pollinose except near center of occiput, two stripes on metanotum, scutellum, and dorsum of abdomen. Pile white, black on face, antennae, center of metanotum, scutellum, about genitalia and ocelli; a row of black pile about posterior orbits and sometimes on posterior oral margins. That on face and longer ones on antennae about as long as first antennal joint. Tomentum absent on head and thorax, silvery on femora and abdomen below, yellowish above, of narrow curved scales for the most part. Wings light smoky hyaline. Empodium present. Antennae, first joint 0.21 mm, second joint 0.09 mm, third joint 0.6 mm, long. Length, 5 to 7 mm.

*Female.*—Similar to male. Lighter in ground color and with pollinose areas more extensive. Pile white, black on ocellar tubercle, dark part of metanotum, scutellum and about tip of abdomen. That on face and antennae white, about as long as second antennal joint; a group of white hairs on front below ocelli; remainder bare. Tomentum golden above, white below.

*Type.*—Male, *allotype* female and one female *paratype*, Southern Arizona, (F. H. Snow), August, 1902; a paratype male, Magdalena, New Mexico, in the University of Kansas collection.

### 17. **Geron (Empidigeron) nudus** new species

*Male.*—Ground color black, middle and hind tibiae brown; gray pollinose except on upper half of occiput, caudal part and two anterior stripes on metanotum, scutellum and abdominal dorsum. Pile white, black on tip of abdomen, scutellum, dark parts of metanotum and occiput and antennae. A row of black hairs on orbits and about sides of oral cavity. Face and front bare of tomentum and pile, but silvery pollinose as usual. Tomentum sparse golden on posterior corners of metanotum and abdominal dorsum, silvery below and on femora. Wings smoky hyaline. Empodium present. Antennae, first joint 0.18 mm, second joint 0.07 mm, third joint 0.57 mm, long. Antennal pile scarcely as long as second joint. Length, 5.5 mm.

*Female.*—Similar to male. Minute white pile on front and genae. No empodium. Length, 4 mm.

*Holotype.*—Male; near Highrolls, Otero County, New Mexico, June 21, 1929, elevation 6000 ft., (E. M. and R. H. Painter).

*Allotype.*—Female; Tajique, New Mexico, August 12, 1931, (R. H. Painter).

18. **Geron (Empidigeron) snowi** new species (Pl. X)

*Male.*—Ground color brownish black, lighter on tibiae and posterior margins of sternites; lightly grayish pollinose below, extending a short way up on the dorsum of the thorax as a midline and as a narrow border to the transverse suture. Pile long black, white on abdomen except tip, on pollinose areas of thorax, on coxae, and on wing base. Long and bushy on head; that on face about as long as third joint of antennae, that on antennae about as long as first joint. Tomentum lacking on head and thorax, sparse and golden on abdomen above; silvery below and on femora, of slender cuneate scales. Wings light smoky hyaline. Empodia present. Antennae, first joint 0.21 mm, second joint 0.09 mm, third joint 0.45 mm, long. Length, 4 to 6 mm.

*Female.*—Somewhat similar to male. Lighter in ground color, pile white, black on dorsum of thorax, antennae and about ocelli. Tomentum rather abundant (for the subgenus), especially on the abdomen, golden above, silvery below. Pile of front white, arranged in two rows running dorsally above the antennae, on face white, rather sparse, arranged roughly in a group below each antenna, about as long as second antennal joint. Pile on antennae about the same length.

*Holotype.*—Male; Magdalena Mountains, New Mexico, August, 1894, (Snow).

*Allotype.*—Female; same data as type male.

*Paratypes.*—13♂, 9♀; same data as type male. 4 ♂, 11♀; Magdalena, New Mexico. 1♂, 1♀; Southern Arizona, (F. W. Snow), August, 1902.

The above series in the collections of Kansas University, University of Arkansas, and of the author. The species is named in honor of the collector, Dr. F. H. Snow.

19. **Geron (Empidigeron) hybus** Coquillett

1894. *Geron hybus* Coquillett, Trans. Am. Ent. Soc., xxi, p. 112.

The following is a copy of Coquillett's description:

*Geron hybus* n.sp. ♂ ♀.—Opaque black, knob of halteres light yellow. Head and body light gray pollinose, two spots on upper part of occiput, two stripes on thorax, scutellum, except each side, and abdomen except first segment, opaque black. Pile and tomentum of head white, a few of the pile on antennae and occiput black; depressed tomentum on upper side of body of female yellow (wanting in the male), the pile white, with a few black ones intermixed. First antennal joint over twice as long as the second, both are provided with bristles above and below; (in) the female these scarcely exceed in length, the width of these joints, but in the male they are nearly three times as long; third joint three times as long as the first, gradually tapering to the tip, destitute of bristles. Proboscis slightly longer than the thorax. Wings hyaline, apex of subcostal cell yellowish, last two sections of the third vein subequal in length, posterior cross-vein sinuous. Length, 4 mm.

SOUTHERN CALIFORNIA. Three males and four females, in July.

Two females, Monrovia Canyon, California, August 3, 1930, (T. F. Winburn and R. H. Painter), belong to this species. Practically all of the pile on the antennae is black. The middle tibiae are lighter in color than the others Empodium absent, claws small. Antennae, first joint 0.15 mm, second joint 0.07 mm, third joint 0.42 mm, long.

## Older Descriptions

*Geron senilis* Fab., *rufipes* Macq., *albidipennis* Loew and *holosericeus* Walker have not been identified among the material studied. The descriptions are reproduced here for the benefit of other workers. The species described by Cole and Cresson from female specimens or male specimens with the genitalia in a rosette condition will have to be restudied when more material from the type localities is available.

### 20. **Geron senillis** (Fabricius)

1794. *Bombylius senilis* Fabricius, Ent. Syst., iv, p. 411.
1828. *Geron senilis* Wiedemann, Ausseu. Zweifl., i, p. 357.

Translation of Wiedemann's description:

Deep black, yellowish haired; face white haired. Legs yellowish brown. 2 lines. Male, female. From West Indies.

Antennae black; face snow white haired; vertex of female snow white tomentose. Thorax, at least in the male, yellowish haired, behind the suture short and weak, the remainder similar but thicker. Among the males the lower surface of the abdomen is gray with white hairs; in the females the ground color is black and for the most part abraded, so that I cannot see the color of the hair. Wings hyaline, halteres white. Femora black; tibiae and tarsi light yellowish brown. In Kon Museum at Copenhagen and in my collection.

The description appears to have been drawn from at least two species. In the material studied a male that has yellow pile always had a female with yellow tomentose front. In view of the number of species present on the continent and the probably additional ones in the West Indies it is best to leave this name until the type series can be studied and a holotype selected. Records of this species in the United States are probably misidentifications.

### 21. **Geron rufipes** Macquart

1845. *Geron rufipes* Macquart, Dipt. Exot., Suppl., I, p. 119.

Black. Margins of abdominal segments yellow. Legs red, tarsi black. Length 2½–3 lines. Male, female. Face and anterior part of front with silver down; posterior part of front of a reddish gray; vertex black. Antennae black. Thorax of a dull black (denuded), sides of a yellowish gray, with yellowish hairs. Abdomen brown (denuded), a little yellowish down at the segmental margins. Wings hyaline. From Merida in Yucatan.

The above is a translation of the original description. The status of this species is discussed under *G. litoralis*.

### 22. **Geron holosericeus** Walker

1849. *Geron holosericeus* Walker, List Dipt. Br. Mus., II, p. 295.

Copy of Walker's description:

Mas. Body black head thickly clothed with white hairs behind, and adorned with silvery down on the front: eyes red: lip black, more than half the length of the body: feelers black first and second joints clothed with pale yellow hairs; second joint not half the length of the first; third joint spine-shaped, or tapering from the base to the tip, much longer than the first and the second joints: fore part of the chest very thickly clothed with long hoary hairs: abdomen covered with short gray hairs. legs black, beset with short black bristles; shanks dark ferruginous, black at the tips: wings colorless; wing-ribs ferruginous; veins black, ferruginous at the base; poisers tawny, with bright yellow knobs. Length of the body 2½ lines; of the wings 5 lines. A. Georgia. B. —?

The description contains more characters of diagnostic value than is usual with Walker's descriptions. But the available material from the southeastern United States is not sufficient to permit the recognition of this species.

**23. Geron albidipennis** Loew

1869. *Geron albidipennis* Loew, Berl. Ent. Zeit., XIII, p. 174. (Cent., IX, 78).

♂. Black, opaque, clothed above with whitish pile, below white. Legs black, wing pure hyaline, lightly whitish. Stigma colorless. The next to last segment of the third longitudinal vein equal to twice the last segment of the vein Posterior cross vein slightly bent, length body 1½ lines, wings 1½ lines.

Black, opaque, eyes contiguous, antennae black, first two joints closely white pilose, face glittering white pilose. Pile of occiput white, next to vertex and on it, yellow. Dorsum of thorax and scutellum entirely black and opaque. Pile light whitish yellow and tomentum scattered golden. Extreme anterior dorsal margin white pilose. Abdomen black; pile whitish and tomentum scattered golden. Extreme anterior dorsal margin white pilose. Abdomen black; pile whitish and tomentum scattered golden. Sides widely, and venter white pollinose, clothed with white pile and close glittering white tomentum. Legs black, middle tibiae brownish-black. Halteres yellow, wings pure hyaline, lightly whitish, stigma colorless, second submarginal cell widely dilated and shortened so that the next to the last segment of the third longitudinal vein is equal to twice last segment. (Cal. Agassiz.)

The above is a translation of the original description. The following is a summary of some notes sent by Mr. Banks after comparison of specimens of *winburni*, *nigripes* and *parvidus* with the type. The type male is shrunken from being preserved in alcohol or pinned in a teneral condition. It is intermediate in size between *winburni* and *parvidus*, but with genitalia similar to the former. The hair at the base of antennae is plainly yellowish, that below is white but not as snow white as in *parvidus*. This might be the result of having been in alcohol. The ground color of the legs and abdominal hair is similar in coloration to those of *parvidus*. *Albidipennis* differs from both *parvidus* and *winburni* in that the posterior cross vein is more strongly bent and oblique so that if extended it would end beyond the end of the second vein.

The description of *Geron insularis* (Bigot) is not available, but specimens probably could not be identified from the description.

## PLATE X

### Genitalia of species of *Geron*

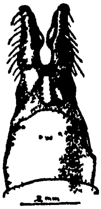
*Geron grandis*, digitate and rosette condition from ventral, lateral and caudal aspects. (Drawn from specimens cleared in caustic potash.)

*Geron snowi*, lateral aspect. (From specimen cleared in caustic potash.)

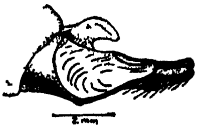
*Geron litoralis*, *versicolor*, *arenicolus*, ventral aspect; *subauratus*, ventral and lateral aspects. (From pinned specimens.)

## PLATE XI

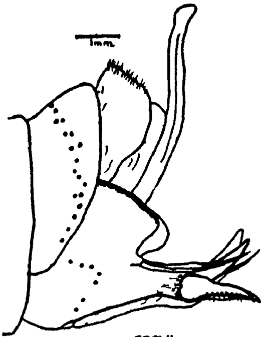
Genitalia of species of *Geron:* ventral and lateral aspects. (Drawn from pinned specimens using the same magnification throughout.)



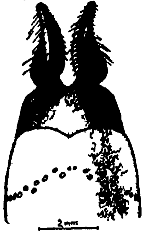
subauratus



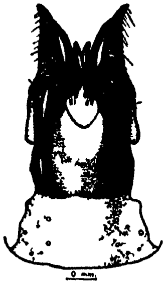
subauratus



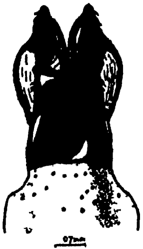
snowi



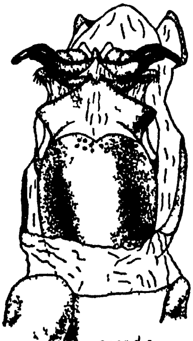
litoralis



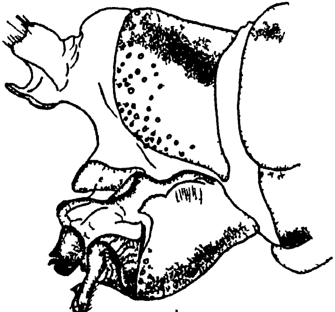
versicolor



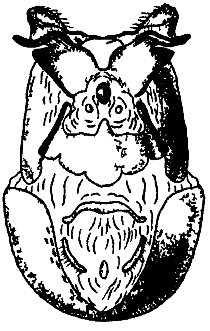
arenicolus



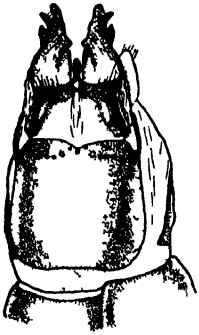
grandis



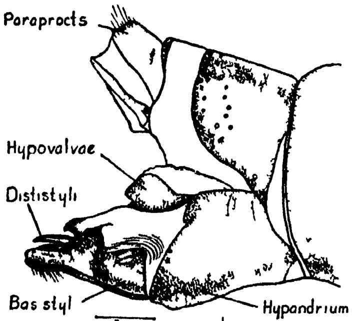
grandis



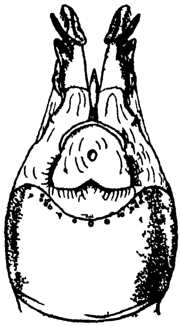
grandis



grandis

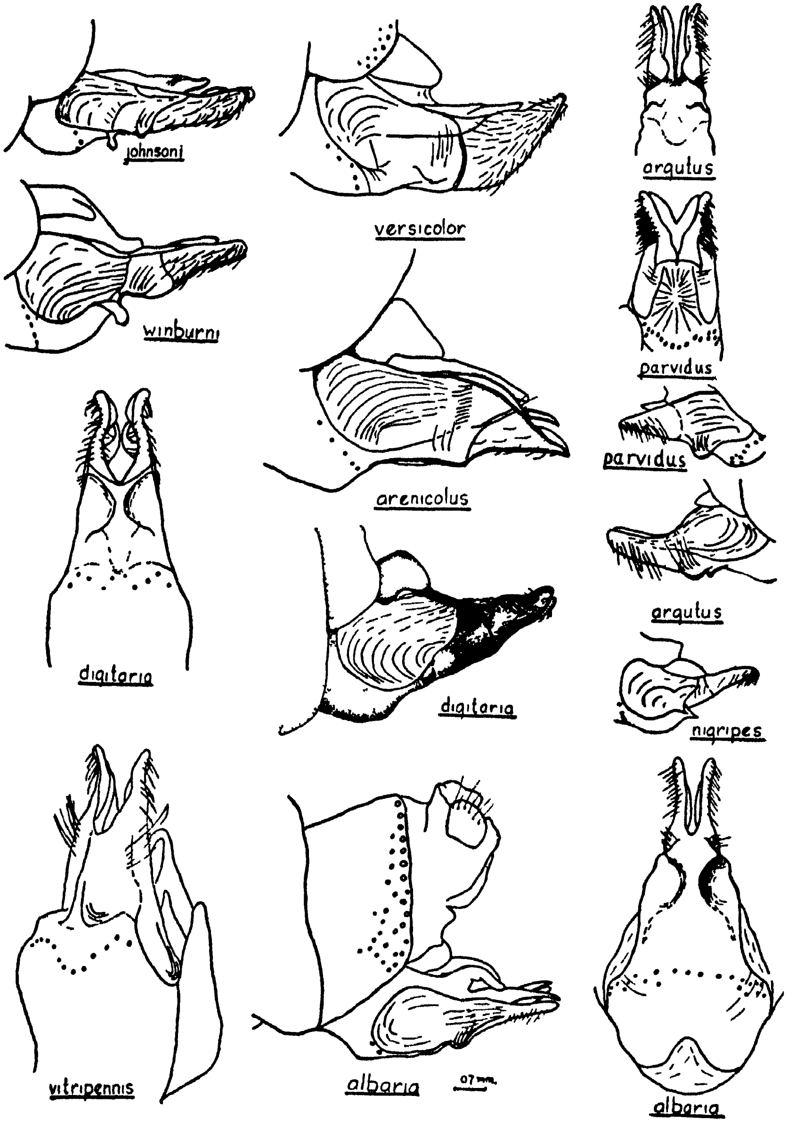


grandis



grandis

PAINTER—THE GENUS GERON



PAINTER—THE GENUS GERON

# STUDIES IN THE GENUS PHOCIDES WITH DESCRIPTIONS OF NEW SPECIES

## (LEPIDOPTERA: HESPERIIDAE)

BY E. L. BELL

*Flushing, New York*

The genus *Phocides* was erected by Hübner[1] and contained three species, of which no one was congeneric with the other; but the first mentioned, the type, is his own *cruentus*. On page 110 of the same publication, he erected the genus *Erycides* for *pigmalion* Cramer, and his *megalesius*, *pigmalion* being the type.

Scudder[2] erected the genus *Dysenius*, with *albicilla* Herrich-Schäffer as the type.

Hübner's *cruentus* being synonymous with *palemon* Cramer which has priority must fall to the latter name, and *palemon* therefore becomes the type of the genus. *Pigmalion* Cramer being congeneric with *palemon* Cramer automatically places the genus *Erycides* in synonymy with *Phocides*. *Albicilla* Herrich-Schäffer (synonymous with *lilea* Reakirt) is also congeneric with *palemon* Cramer, therefore Scudder's genus *Dysenius* falls as a synonym of *Phocides*.

Much the same difficulty occurs in this genus as in some of the genera of the *Pyrrhopyginae* in the identification of material from published descriptions, and as in that sub-family there are often several species which have a very similar form of pattern in the maculation but a distinct form of the male genitalia. Many of the *Phocides* species bear a considerable resemblance to species in the *Pyrrhopyginae* genera *Mimoniades* and *Jemadia*, but, of course, may be readily separated on their superficial characteristics, the most obvious of which are the form of the antennae, the presence of the costal-fold in the males, the longitudinal basal rays of the primaries (which are transverse in the *Pyrrhopyginae*).

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[1] Verzeichniss bek. Schmetterlinge, p. 103, (1820).

[2] Rept. Peabody Acad. Sci. for 1871, p. 46, (1872). (Syst Revision.)

The writer has seen many examples of miscellaneous mending of specimens, in which *Pyrrhopyginae* species have the antennae of *Phocides*, and *Phocides* with antennae of *Pyrrhopyginae*, sometimes this mending is so cleverly done as to appear to be quite genuine, but if one takes into consideration the other characters the fraud at once becomes apparent. The writer cannot too strongly condemn the practice of mending specimens with parts of others, often with totally unrelated insects, and believes that it is much better to have a damaged but authentic specimen in the collection than a monstrosity that does not exist in nature.

The form of the male genitalia is constant throughout the genus, with good individual characteristics, and it shows that the genus is a very natural one.

It is uncertain that all of the Mabille, and Mabille and Boullet, references given in this paper really refer to the species they are placed under.

In order to provide an aid for those using this paper in identifying their material, the species have been divided into groups and these further divided, placing together those species with similar characteristics of maculation. Unfortunately there is considerable variation, as might be expected with insects having so many spots and bands, so that it is almost, if not quite, impossible to formulate an infallible key for their superficial separation in all cases, therefore the characters given here must be considered to apply only to well and typically marked individuals; in case of doubt as to the identity of specimens, resort will have to be made to the form of the male genitalia.

The writer expresses sincere appreciation for the valuable assistance of his friends, Capt. R. C. Williams, Jr. and Mr. F. E. Watson.

The measurement of expanse given in this paper is twice the distance from the center of the thorax to the apex of one primary.

The localities cited under distribution as given by Mabille and Boullet [M. & B.] and by Godman and Salvin [G. & S.], are based on the works of those authors; those of material in the American Museum of Natural History [A.M.] and in the collection of the author [B.] are based on my own studies; those of material in the Academy of Natural Sciences of Philadelphia [A.N.S.] are based on data furnished by Capt. Williams.

The figures of the imago given on the last three plates are approximately natural size.

## PHOCIDES

Hübner, Verzeichniss bek. Schmetterlinge, p 103, 1820.

LOGOTYPE: *Phocides cruentus* Hübner (*palemon* Cramer).

*Genitalia.*—The uncus terminates in a single arm, the apex provided with a claw-like hook in the center; a basal flange on each side. The aedoeagus is stout, sometimes long, carries a number of internal spines, and usually a number of short teeth at and near the apex; in some species there are two short projections from the extreme base, forming a T-shaped process. The claspers carry a number of serrations at and near the apex.

*A. No hyaline spots of the primaries. Basal rays of both wings greenish or bluish, generally rather poorly developed, and sometimes absent*..............................(178)*

*1. Primaries with a red, or blue, costal bar, or spot in the cell. (Absent in palemon ab. gunderi.)*................(175)

**Phocides palemon** (Cramer) (Pl. XII, fig. 1)

*Papilio palemon* Cramer, Pap. Exot., II, p. 54, pl 131, fig. F, 1779.

*Hesperia palemon* Fabricius, Spec. Ins., II, p. 134, 1781. Ent. Syst., III, part 1, p. 335, 1793.

*Erycides palemon* Mabille, Ann Soc. Ent. France, 5th ser., x, Bull, page xlvi, 1880.

*Phocides palemon* Godman and Salvin, Biol. Centr.-Amer., Rhopal, II, p. 295, 1893. Mabille and Boullet, Ann. des Sciences Nat. Paris, 9th ser., XVI, pp. 18, 22, 1912. Draudt, Seitz Macrolep. of the World, v, p. 850, pl. 165 d, (as *spurius*), 1921.

*Hesperia polybius* Fabricius, Ent. Syst., III, part 1, p. 337, 1793. Latreille, Enc. Meth., IX, p. 732, 1819.

*Phocides cruentus* Hubner, Verz. bek. Schmett, p 103, 1820. Watson, Proc. Zool. Soc. London, p. 22, 1893. Mabille, Gen. Insect, Hesp, p. 19, 1904.

*Erycides spurius* Mabille, Ann Soc. Ent. France, 5th ser., x, Bull., p. xlvi, 1880. Genera Insect, Hesp, p. 19, 1904.

*Phocides spurius* Mabille and Boullet, Ann. des Sciences Nat. Paris, 9th ser., XVI, pp. 19, 22, 1912. Kaye, Memoirs Dept. Agric. Trinidad and Tobago, (2), p. 123, 1921.

*Phocides palemon* var. *unimacula* Mabille and Boullet, Ann. des Sciences Nat. Paris, 9th ser., XVI, pp. 18, 22, 1912. Draudt, Seitz Macrolep. of the World, v, p. 850, 1921.

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* The alternatives will be found on the pages thus indicated.

Cramer's figure appears to be that of a female and shows but one red spot in the costal area of the primaries, the one in the cell. The secondaries show that there is a marginal white band, somewhat sinuous on the inner edge. The basal rays of both wings are portrayed as well as may be expected considering the antiquity of the work.

Typical *palemon* seems to be confined to the northern part of South America and Panama. It has the basal rays of the primaries more or less well developed, those of the secondaries rather indistinct; the red costal bar of the primaries is more often composed of two spots than only one, but it varies considerably, the upper spot may be reduced to a mere dot, or absent (typical *palemon* Cramer and *unimacula* Mabille and Boullet), or both spots may be absent (ab. *gunderi* Williams and Bell). The fringe of the primaries may be entirely white, or darkened at the apex of the wing, or more or less mixed with black over the entire length. The fringe of the secondaries in the anal area is red, or orange-red, above it, white. The secondaries have a marginal white band as broad, or broader than the fringe in the center and narrowing toward the anal angle, more or less suffused with black scales along the border of the black part of the wing, and cut by the black veins to, or almost to, the outer edge of the wing, sometimes the white band continues inside the red fringe at the anal angle for the entire length of the outer margin of the wing, sometimes only part way, and sometimes it is red the same as the fringe. The greenish lines of the thorax and tegulae are usually well developed.

Specimens from Peru, Bolivia, and parts of southern Brazil, differ in being a little smaller, the white marginal band of the secondaries much narrower, so that the black veins do not prominently cut it, but make the inner edge appear a little undulate. The same variation occurs in the red costal bar as in the typical form, and in one specimen there is an additional minute spot below the cell, making three spots in the bar.

Specimens from Santa Catharina, Brazil, average a little larger than others, the wings very black with a decided greenish sheen extending entirely over them, the red costal bar of the primaries often with a purplish tinge; the basal rays of the primaries very weakly developed or absent, those of the secondaries usually absent; the white marginal band of the secondaries is very narrow above vein 2, absent toward the outer angle, below vein 2 it is red, and very broad at the anal angle, where vein 1 b projects into it a prominent black tooth.

The writer is unable to distinguish *spurius* Mabille from *palemon* Cramer, either by the original description or by the later paper of Mabille and Boullet.

As above stated the Cramer figure of *palemon* shows that there is but a single spot in the red costal bar of the primaries, the spot in the cell, and therefore the name *palemon* must apply to those individuals having that characteristic. Mabille and Boullet could not have consulted the figure of Cramer when they gave the name *unimacula* to the insect with the single cell-spot and this name must now be placed in synonymy.

The termination of the claspers is obliquely truncate, with some small serrations. It does not materially differ in form in the variations of maculation mentioned.

*Distribution.*—Type locality: Surinam; of *polybius*, "In Indiis" of *cruentus*, not given; of *spurius*, not given; Mabille and Boullet mention French Guiana and Brazil; of *unimacula*, not given; Mabille and Boullet mention Argentine and Brazil.

St. Laurent, French Guiana; Colombia; St. Ann's, Trinidad; Santa Cruz, Bolivia; Obidos, Aracatuba, Sao Paulo, Hansa Humboldt, Santa Catharina, Neu Bremen, Brazil, [all B.]. Sapucay, Villa Rica, Paraguay, [A.N.S.].

**Phocides palemon** race **phanias** (Burmeister)

*Eurycides phanias* Burmeister, Atlas Descr Phys. Rep. Argentine, 5th section, (2), Lepid , p 56, 1879. Druce, Trans. Ent. Soc. London, p. 377, 1908.

This name may apply to the Argentine race, as Burmeister compared it with *palemon*, stating that it was smaller and that the abdominal rings have two blue dots on the back and a line of the same color on each side, which do not appear to be present in any of the specimens at hand, although none of them are from Argentine.

*Distribution.*—Type locality: Argentine.

**Phocides palemon** ab. **gunderi** Williams and Bell

*Phocides palemon* ab. *gunderi* Williams and Bell, Trans. Amer. Ent. Soc., LVII, p. 251, 1931.

Differs from typical *palemon* in the entire absence of the red costal bar of the primaries.

*Distribution.*—Type locality: Rockstone, British Guiana.

**Phocides palaemonides** Rober

*Phocides palaemonides* Rober, Ent. Mitteil., xiv, p. 159, 1925.

According to the description taken from a female from an unknown locality, this insect differs from *palemon* Cramer in having narrower secondaries, the red spots of the primaries are not in line, the upper one being distally placed; the fringes pure white, not mixed with black scales; the margin of the secondaries is pure white for about double the width of the fringes; the anal angle with less orange area. The under side black with only sparse greenish reflections, especially on the secondaries, the base of the primaries more prominently scaled with green. The rest of the insect scarcely differing from *palemon*, except that the black area between the antennae is broader and with two shining green dots.

The writer believes this to be merely a minor variation of *palemon*, as the characters given for the separation of the two insects can be found in most any long series of *palemon*.

**Phocides lilea** (Reakirt) (Pl. XII, fig. 2)

*Erycides lilea* Reakirt, Proc. Acad. Nat. Sci. Phila., xviii, p. 339, 1866.

*Phocides lilea* Godman and Salvin, Biol. Centr.-Amer., Rhopal., ii, p. 296, 1893; p. 733 (Supplement), 1901; iii, pl. 76, figs. 23, 24, 1893. Dyar, Journ. New York Ent. Soc., xiii, p. 113, 1905. Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., xvi, pp. 19, 22, 1912. Draudt, Seitz Macrolep. of the World, v, p. 850, pl. 165 d, 1921. Skinner and Williams, Trans. Amer. Ent. Soc., xlviii, pp. 111, 112, fig. 3, 1922. Holland, Butt. Book, Rev. Ed., p. 327, pl. 49, fig. 2, 1931.

*Erycides albicilla* Herrich-Schaffer, Corresp.-blatt. zool.-mineral. Ver. Regensb., xxiii, p. 169, 1869. (Prodr. Syst. Lep., part 3, p. 61, 1869.)

*Dysenius albicilla* Scudder, Rept. Peabody Acad. Sci. for 1871, p. 46, 1872.

*Erycides albicilla* Plotz, Stett. Ent. Zeit., xl, p. 406, 1879.

*Erycides socius* Butler and Druce, Cist. Ent., i, p. 112, 1872.

*Erycides cruentus* Scudder (not Hübner), Rept. Peabody Acad. Sci. for 1871, p. 46, 1872.

*Erycides sanguinea* Scudder, Rept. Peabody Acad. Sci. for 1871, p. 47, 1872.

*Phocides sanguinea* Skinner and Williams, Trans. Amer. Ent. Soc., xlviii, pp. 111, 112, 1922.

*Erycides decolor* Mabille, Ann. Soc. Ent. France, 5th ser., x, Bull., p. xlvi, 1880. Mabille, Genera Insect., Hesp., p. 19, 1904.

*Phocides albiciliata* Rober, Ent. Mitteil., xiv, p. 159, 1925.

*Lilea* bears a superficial resemblance to *palemon* Cramer but the fringes of the secondaries are entirely white, there being no reddish area at the anal angle. The white outer margin of the secondaries is either very narrow or absent. The red costal spots of the primaries are variable, in the series examined, the upper one may be as broad as the lower one, placed directly over it or shifted a little one way or the other, it may be reduced to a mere dot or be entirely absent. The characters given by Rober in the description of *albiciliata* do not differ from *lilea* in any important degree.

*Denuba* Plotz is sometimes placed as a synonym of *lilea,* but the Plotz description can in no way refer to *lilea* or any other species of *Phocides,* and in addition the type locality given for *denuba* is Aburi, Africa. This has already been pointed out by Barnes and Benjamin.[3]

Skinner and Williams state that the records of *lilea* north of the Rio Grande River are extremely doubtful, as the Pope Boundary Survey covered both sides of that river, and that it is probable that insects were brought in by natives and may have come from some distance. It has not been recorded north of the Rio Grande since 1871.

The form of the genitalia is similar to that of *palemon,* the termination of the claspers is a little more rounded.

*Distribution.*—Type locality: near Vera Cruz, Mexico; of *albicilla,* not given, Plotz gives Brazil (probably incorrect); of *socius,* Costa Rica; of *cruentus,* Guatemala; of *sanguinea,* Texas; of *decolor,* not given; of *albiciliata,* Guatemala.

Mexico, Guatemala, Honduras, Costa Rica, [G. & S.]. Guadalajuara, Tuxpango, Mexico, [B.]. Colima, Jalapa, Mexico; Costa Rica, [A.M ].

**Phocides imbreus** (Plotz)

*Erycides imbreus* Plotz, Stett. Ent. Zeit., XL, p. 406, 1879. Godman, Ann. and Mag. Nat. Hist., 7th ser., XX, p. 150, 1907.

*Phocides imbreus* Draudt, Seitz Macrolep. of the World, v, p. 850, pl. 165 f, 1921.

The description states that there is no yellow at the anal angle of the secondaries. Primaries with a dark blue spot in the cell. Palpi orange. Base of wings green. Fringes white. Godman says it is unknown to him.

*Distribution.*—Type locality: Central America.

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[3] Bull. So. Cal. Acad. Sci., XXV, p. 27, (1926).

*2. Primaries without a red or blue costal bar or spot in the cell.*

**Phocides scython** (Godman and Salvin) (Pl. XII, fig. 3)

*Erycides scython* Godman and Salvin, Proc. Zool. Soc. London, (February), p. 154, 1879. Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 19, 22, 1912.

*Erycides tophana* Plotz, Stett. Ent. Zeit., XL, (July), p. 406, 1879.

*Phocides tophana* Draudt, Seitz Macrolep. of the World, v, p. 850, pl. 165 d, 1921.

The wings above have a dark greenish sheen, the basal rays indistinct. Fringes white, a little darkened at the apex of the primaries, and orange in the anal area of the secondaries. Sometimes the orange anal area of the fringes of the secondaries is much reduced and very pale. Head and palpi are black with whitish spots and lines. The pectus has a whitish spot on each side at the base. The abdomen is partly ringed with greenish. The anal tuft is black intermixed with whitish hairs.

The terminal arm of the uncus is rather shorter than in *palemon* and *lilea*, and the basal flanges considerably longer, but otherwise similar in form. The aedoeagus is shorter but very stout and the internal spines a little differently placed. The serrations at the apex of the terminal arm of the claspers are quite large.

*Distribution.*—Type locality: Paraguay; of *tophana*, Brazil. Villarrica, Paraguay; Aracatuba, Sao Paulo, Brazil, [B.].

**Phocides charon** (Felder)

*Erycides charon* Felder, Wien Ent. Monat., III, p. 405, 1859. Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 21, 22, 1912.

*Phocides charon* Draudt, Seitz Macrolep. of the World, v, p. 850, 1921.

The description states that the primaries above are dark greenish, with shining atoms at the costa and base; the lower part of the fringes white. Beneath the base of the wings is brownish, inner border bluish, three spots of greenish-white atoms on the costa and toward the base. Secondaries dark bluish on both sides, costal and anal areas violaceous, fringes apically white, anally yellow; beneath with shining greenish atoms at the base and in the disc. Palpi with two white spots, above with three white transverse stripes. Head posteriorly girdled with white and three white transverse dorsal stripes. Thorax black with bluish atoms above, two white spots beneath. Abdomen black, somewhat ringed with white, apex with greenish hairs.

From the characters given by Felder this insect must be very closely related to *scython* Godman and Salvin, in fact seems to differ only in that the abdominal rings are white and the apex with greenish hairs, the corresponding characters in *scython* being exactly the reverse, the rings green and the apex with whitish hairs. If eventually the two names are found to represent the same species, *charon* has priority.

*Distribution.*—Type locality: Brazil.

**Phocides batabano** (Lucas) (Pl. XII, fig. 4)

*Eudamus batabano* Lucas, Sagra Hist. Phys. Polit. et Nat. de l'Isle de Cuba, p. 624, 1857.

*Erycides batabano* Aaron, Papilio, IV, p. 22, 1884. Dyar, Can. Ent., XXII, p. 211, 1890.

*Phocides batabano* Skinner, Trans. Amer. Ent. Soc., XXXVII, pp. 199, 200, pl. 10, 1911. Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 18, 22, 1912. Grossbeck, Bull. Amer. Mus. Nat. Hist., XXXVII, (4), p. 26, 1917. Draudt, Seitz Macrolep. of the World, V, p. 851, pl. 165 d, 1921. Skinner and Williams, Trans. Amer. Ent. Soc., XLVIII, p. 111, fig. 2, 1922. Skinner and Ramsden, Proc. Acad. Nat. Sci., LXXV, p. 308, 1923. Holland, Butt. Book, Revised Ed., p. 327, pl. 40, fig. 1, 1931.

*Erycides mancinus* Herrich-Schaffer, Corresp.-blatt zool.-mineral. Ver. Regensb., XVI, p. 143, 1862. Godman, Ann and Mag. Nat. Hist., ser. 7, XX, p. 150, 1907.

*Erycides okeechobee* Worthington, Papilio, I, p. 133, 1881.

Specimens from Florida average somewhat larger than those from Cuba, but the green basal rays are less pronounced. The species appears to be less common in Cuba than in Florida, where it is apparently confined to the southern part of the State.

The uncus is somewhat like that of *scython* Godman and Salvin in having long basal flanges. There is a dorsal flap on the terminal arm of the claspers.

*Distribution.*—Type locality: Cuba; of *mancinus*, Cuba; of *okeechobee*, Marco Island, Florida. Aaron records specimens from Haiti.

Santiago, Cuba; Miami, Florida, [B]. Big Cypress Swamp, Everglades, Biscayne Bay, Jupiter, Chokoloskee, Florida, [A.M.].

**Phocides batabano** race **batabanoides** (Holland) new combination

*Erycides batabanoides* Holland, Ann. Carnegie Museum, I, pp. 488, 489, 1901–1902.

Described as being smaller and more brilliantly marked with bright blue bands than typical *batabano*.

*Distribution.*—Type locality, not definitely stated but said to be more rare on Nassau, and common on Andros Island, Bahama Islands.

*B. Primaries with hyaline spots (absent in yokhara ab. pratti). At least some part of the maculation of either or both wings some shade of red, orange or yellow*...................(184)

**Phocides oreades** (Hewitson) (Pl. XII, fig. 5)

*Erycides oreades* Hewitson, Exot. Butt., v, pl. Pyrrhopyga V and Erycides, figs. 32, 35, 1874.

*Erycides sela* var. *oreades* Staudinger, Exot. Schmett, p. 295, pl. 99, 1888.

*Phocides oreades* Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., xvi, pp. 12, 21, 1912. Draudt, Seitz Macrolep. of the World, v, p. 850, pl. 165 e, 1921.

On the upper side of the primaries the basal rays are partly green and partly orange; the outer, submarginal band of spots is green; the hyaline bands and subapical spots are orange. On the same surface of the secondaries the basal and discal bands are orange and the submarginal band green. Beneath all of the maculation of the secondaries is green.

The spelling of the name is above on the plate mentioned but in the text, on the following page, it is "*oreides.*"

The characters found in the genitalia of those species in this group, which have been available for examination, are not strikingly different. The claspers in each terminate a little different, but in all there is considerable similarity. In *oreades* the claspers have a few serrations, the two lower of which are quite large, the upper ones smaller.

*Distribution.*—Type locality: Peru. Peru, [B.]. Colombia, [A.M.]. Muzo, Colombia, [A.N.S.].

**Phocides charonotis** (Hewitson)

*Ericides charonotis* Hewitson, Bolivian Butt., p. 21, 1874.

*Erycides charonotis* Exot. Butt., v, pl. Pyrrhopyga V and Erycides, figs. 33, 34, 1874.

*Phocides charonotis* Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., xvi, pp. 12, 13, 21, 1912. Draudt, Seitz Macrolep. of the World, v, p. 850, 1921. (Not plate 165 e.)

The description states that on the primaries the basal rays, a spot on the inner margin, one near the costal margin, and the submarginal band are irrorated with green, the hyaline spots pale yellow. Secondaries with all of the maculation orange-yellow. Beneath all of the maculation of both wings is orange. The figure in Exot. Butterflies clearly shows the coloration of the maculation.

The Draudt figure does not agree with the description or the figure of Hewitson and may possibly refer to one of the following.

*Distribution.*—Type locality: Bolivia.

**Phocides oreas** Mabille and Boullet (Pl. XII, fig. 6)

*Phocides oreas* Mabille and Boullet, Ann. des Sci Nat. Paris, 9th ser., xvi, pp. 11, 12, 21, 1912. Draudt, Seitz Macrolep. of the World, v, p. 850, 1921, (as form of *oreades* Hewitson).

*Oreas* is often placed as a form of *oreades* Hewitson, but in that species the maculation of the under side of the secondaries is entirely green, in *oreas* it is entirely fulvous, as in *charonotis* Hewitson, and it may possibly be a form of that species, from which it is distinguished on the upper side by having all of the maculation of both wings fulvous. The palpi are yellow, edged with black, or black with a yellow stripe in the center. There is a male specimen in the collection of the writer which has the submarginal band of the primaries greenish, all the rest of the maculation fulvous.

The internal spines of the aedoeagus are fewer in numbers but very large. The claspers at the apex have only one large and rather blunt serration, followed by a number of small ones.

*Distribution.*—Type locality: Bolivia and Peru. Rio Songo, Bolivia, [B.].

**Phocides oreas** form **dryas** Le Cerf

*Phocides dryas* Le Cerf, Bull. du Mus. d'Hist. Nat. Paris, xxviii, p. 163, 1922.

Described as very much like *oreas* Mabille and Boullet, differing in the palpi being black, not striped with yellow, the first joint with a few blue scales; cheek-tufts black mixed with yellow; legs striped with blue, instead of yellow; fringes less distinctly cut with white and sometimes not at all between veins 5 and 8; hyaline spots of the primaries somewhat narrower.

The form of the genitalia is identically the same as that of *oreas* Mabille and Boullet.

Whether *dryas* is the Peruvian race of *oreas* or merely a form of that species is uncertain from the insufficient material at hand.

*Distribution.*—Type locality: northern Peru; paratypes from Huancabamba and Chanchamayo, Peru.

Huancabamba, Peru, [B.].

**Phocides debora** Mabille and Boullet

*Phocides debora* Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 12, 21, 1912. Draudt, Seitz Macrolep. of the World, V, p. 850, 1921, (as form of *oreades* Hewitson).

According to the description, *debora* differs in having the hyaline spots of the primaries pale yellow instead of red-fulvous. The bands of the under side of the secondaries are also pale fulvous.

Although placed as a form of *oreades*, the coloration of the bands on the under side of the secondaries seems to indicate a closer relationship with *charonotis*, or *oreas*, than with *oreades*.

*Distribution.*—Type locality: Bolivia.

**Phocides yokhara** (Butler) (Pl. XII, fig. 7)

*Erycides yokhara* Butler, Trans. Ent. Soc. London, p. 500, 1870.

*Phocides yokhara* Mabille and Boullet, Ann des Sci. Nat. Paris, 9th ser, XVI, pp. 13, 14, 21, 1912. Draudt, Seitz Macrolep. of the World, V, p. 850, pl. 165 e, 1921.

All of the maculation of both wings, above and below, is orange-red, except that the lowest spot of the discal hyaline band of the primaries is yellowish beneath, sharply contrasting with the upper part of this band. The ground color of the wings, on both sides, is black with a greenish sheen. On the secondaries the submarginal band begins broad on vein 8 and tapers toward the anal angle, the next inner band is short, narrow and only a little separated from the submarginal band; a long basal band and a narrow ray on the edge of the abdominal fold. Beneath, the small band parallel to the submarginal band is broader and continued to the costal margin of the wing, the band on the abdominal fold absent.

The claspers are rather truncate at the apex, with some small serrations.

*Distribution.*—Type locality: Peru.

Ecuador, [B.]. Below Macas on Rio Topo, Ecuador, [A.N.S.].

**Phocides yokhara** form **inca** Le Cerf

*Phocides yokhara* s.sp. *inca* Le Cerf, Bull. du Mus. d'Hist. Nat. Paris, p. 162, 1922.

Described as a melanic form with reduced maculation. The secondaries lacking the ray on vein 1; the basal band filiform; the median band reduced to a few scales on the discocellulars; submarginal band broken into widely separated spots. On the under side with a diffuse fulvous spot in the cell; a few scales on the discocellulars; submarginal band reduced, the upper part darkened with blackish. The lateral fulvous lines of the abdomen vestigial.

*Inca* seems to be merely a transitional form between *yokhara* and the following *pratti*.

*Distribution.*—Type locality: Charape River, Tabaconas, north-east Peru, (4,000 ft.).

**Phocides yokhara** form **pratti** Le Cerf

*Phocides yokhara* s.sp *inca* ab *pratti* Le Cerf, Bull. du Mus. d'Hist. Nat. Paris, p. 163, 1922.

Described as differing from *yokhara* in the absence of the hyaline spots of the primaries. Secondaries above with the maculation similar to that of *inca;* on the under side still more reduced. Two males are mentioned as being transitional between the two forms, in which there is a small fulvous hyaline spot near nervure 2. In two paratypes there is a large, irregular, diffuse, fulvous spot formed by the extension of the submarginal band, between veins 2 and 8, filling the outer half of the cell, on the under side of the secondaries.

*Pratti* was described as being an aberration of the form *inca,* but besides the type specimen there were six paratypes before the author when he described it, all from the same locality, and it would seem therefore that it was much too abundant to be considered an aberration; besides there were only two specimens of *inca* in the type series and an aberration is hardly likely to be more abundant than the typical form.

*Distribution.*—Type locality: Charape River, Tabaconas, north-east Peru, (4,000 ft.).

**Phocides pialia** (Hewitson) (Pl. XII, fig. 8)

*Pyrrhopyga pialia* Hewitson, Exot. Butt., II, Pyrrh , pl. 2, fig. 12, 1857.

*Phocides pialia* Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 12, 21, 1912. Draudt, Seitz Macrolep. of the World, v, p. 850, pl. 165 e, 1921.

The hyaline spots of the primaries are red-fulvous on both sides of the wing; all the rest of the maculation of both wings is green. The palpi beneath are black at the sides and greenish, or greenish and white intermixed, in the center.

The females are larger, the primaries not quite so sharply pointed, the hyaline bands a little broader.

The terminal arm of the claspers is sinuous on the dorsal edge, and tapers sharply to a pointed apex, which is without serrations.

*Distribution.*—Type locality: Brazil.

P. Alegre; Neu Bremen (Febr'y, March); Mafra; Parana, Brazil, [B.]. Amazon, Brazil, [A.M.].

**Phocides zancleius** new species (Pl. XIII, fig. 9)

Resembling *pialia* Hewitson but smaller, primaries more pointed and a little excavate on the outer margin. The orange hyaline bands of the primaries consist of three narrow spots in a slightly bowed discal band, the first in the cell, the next below it, and the third in interspace 1 short and triangular, its apex reaching about the middle of the interspace; two extra-discal spots slightly curved on their outer edge and pointing directly downward; five subapical spots, the two lower, in interspaces 5 and 6, the larger. The basal and inner marginal rays of the primaries are very poorly developed; the submarginal band is present in a few scales only. The bands of the secondaries are very narrow. All of the bands and rays of both wings (except, of course, the hyaline bands of the primaries) are blue; not brilliant green as in *pialia*. The fringes of the primaries are black; of the secondaries very narrow, white cut by black at the vein-ends.

Beneath dull black, the primaries pale brown at the base and on inner margin, a short, narrow yellow-brown bar at the costa toward the base, the orange hyaline spots repeated, the submarginal blue band merely a few scattered scales in interspaces 1 and 2. The secondaries with the usual bands blue, beginning at the costal margin. Abdomen spotted with blue above on each side of the center. Head black spotted and lined with white and blue. Collar, shoulder-covers and tegulae black with interspersed blue hairs. Palpi beneath pale-fulvous, edged with black externally. Pectus black with a small bluish-white stripe on each side. Legs striped with pale bluish and white. Anal tuft black with a few pale hairs at the tip.

This species also differs from *maximus* Mabille in the smaller size, the very narrow hyaline bands of the primaries and the pale yellow palpi. Rober did not state the color of the palpi of his *parvus* but he did say that "Body and appendages show no differences" from *maximus* and in that species the palpi are black with some bluish-white hairs intermixed.

Expanse, 58 mm.

The claspers differ in form from those of *pialia* in not being so sinuous on the dorsal edge of the terminal arm, which ends in two pronounced serrations, the lower of which is double pointed at its apex. The basal flanges of the uncus are very small.

*Holotype.*—Male; Massaranduba, Blumenau, Santa Catharina, Brazil, [Collection of the author].

**Phocides maximus** (Mabille)

*Erycides maximus* Mabille, Le Naturaliste, 2nd ser , II, p 77, fig. 2, 1888.

*Phocides maximus* Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 13, 21, 1912. Draudt, Seitz Macrolep of the World, v, p. 851, 1921. Riley, Trans. Ent. Soc. London, p. 232, 1926.

The single specimen in the collection of the writer is a female and agrees with the description and figure. The type is apparently a female also. The discal hyaline band of the primaries terminates extraordinarily broad on vein 1, the basal green rays are short and poorly developed. The three green bands of the secondaries are not strongly developed and the submarginal band is broken into spots. The palpi are black, mixed with some bluish-white scales.

*Distribution.*—Type locality: Brazil.

Passa Quatro, Minas Geraes, Brazil, [B.].

**Phocides iphinous** (Latreille)

*Hesperia iphinous* Latreille, Enc. Meth., IX, p. 736, 1819. Doubleday, Westwood and Hewitson, Gen. Diurn. Lep., p. 510, 1852. Mabille, Bull. Soc. Ent. France, pp. 334, 335, 1909. (Notes.)

*Phocides iphinous* Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 11, 21, 1912. Draudt, Seitz Macrolep. of the World, v, p. 851, 1921. Riley, Trans. Ent. Soc. London, p. 232, 1926.

The writer assumes that Mabille has correctly identified the Latreille insect as a *Phocides.* Capt. Riley states that the type is missing in the Latreille collection. The description states that the primaries have three russet-yellow bands, the first in the center very large, a long oblique square, forming a transverse band which does not reach either border, the two others smaller and oval, between the first band and the apical angle, the one nearest the angle being more oblong. The under side of the secondaries with transverse and oblique rays of bluish-white, of which only the first is unbroken and plainly marked. Body black, with transverse stripes of bluish-white on the abdomen, the rubbed thorax may have had longitudinal stripes as there are vestiges of grey-white spots. Under part of the palpi and several spots on the head bluish-white. Fringes of secondaries white with a series of black spots.

*Iphinous* has been placed by authors in both *Mimoniades* and *Phocides.* Mabille claims to have had before him a specimen from the Leyden Museum which agreed with the Latreille description and that this specimen is a *Phocides.*

*Distribution.*—Type locality: Brazil.

**Phocides parvus** Rober

*Phocides parvus* Rober, Ent. Mitteil., xiv, p. 93, 1925.

Described from two males, which differ from *maximus* Mabille in the discal band being much narrower, one-half as broad in one and a little broader in the other; the lowest spot narrower than the one above it and pointed at the apex. The extradiscal spots also somewhat narrower. The blue basal rays and inner marginal streak indicated only by scales. The secondaries same as in *maximus.*

*Distribution.*—Type locality: Sao Paulo, Brazil.

*C. Primaries with white hyaline spots. (Absent in urania race vida.) The rest of the maculation of both wings blue, or greenish-blue, and white; or decidedly green.*

*1. Maculation not decidedly green. Primaries above with the basal blue ray below vein 1 unbroken from the wing base to near the anal angle. Secondaries beneath with the discal blue band not united with the submarginal blue band on vein 3*.......(189)

**Phocides pigmalion** (Cramer) (Pl. XIII, fig. 10)

*Papilio pigmalion* Cramer, Pap. Exot., III, p. 87, pl. 245, figs. A, B, 1782.

*Erycides pigmalion* Mabille, Ann. Soc. Ent. Belg., XXVII, (C. R., p. lii), 1883.

*Phocides pygmalion* Godman and Salvin, Biol. Centr.-Amer., Rhopal., II, p. 292; III, pl. 76, fig. 16, 1893. Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 14, 21, 1912.

*Phocides pygmalion* Draudt, Seitz Macrolep. of the World, V, p. 850, pl. 165 e, 1921.

? *Sphinx bicolora* Linne, Aubenton, Planches Enlumeneez D'Hist. Nat., (Buffon, Planches Colorees, vol. 1), pl. 18, figs. 8, 9, 1783.

*Hesperia gnetus* Latreille (not Fabricius), Enc. Meth , IX, p. 736, 1823.

*Jemadia licinus* Godman and Salvin (not Moschler), Biol. Centr.-Amer., Rhopal., II, p. 265, 1893; p. 731 (Supplement), 1901.

The Cramer description is lacking in many details but the figure serves fairly well for the identification of the species. It is believed that Godman and Salvin have correctly identified the species and they are followed in this paper.

The name is generally misspelled "*pygmalion*," the original spelling is used here.

The Aubenton figure of *Sphinx bicolora* Linne apparently represents a *Phocides* species and may be *pigmalion* as indicated by Latreille, whether it is actually the insect of Linne is unknown to the writer.

Godman and Salvin state that the insect they described as *Jemadia licinus* Moschler proved to be a female specimen of *Phocides pigmalion* Cramer with the head of a *Jemadia* species attached.

In the specimens at hand the blue basal stripe of the primaries, below vein 1, extends unbroken from the wing base to near the anal angle; the blue stripe above vein 1 is curved and extends from the base under the discal hyaline band and is sometimes united with the submarginal blue band. The submarginal blue band is not continuous but broken at vein 3, the lower part ending at the hyaline spot in interspace 3, the upper part at vein 5, under the subapical hyaline spots with sometimes a spot or two outside of them. In individuals with reduced maculation the submarginal band appears more nearly straight than in well marked ones. The basal blue stripes above vein 2 may be well developed or almost absent. The hyaline spots of the primaries are subject to considerable variation in size and shape, and the triangular spot in interspace 1 often has a minute hyaline dot close to its apex.

On the secondaries there are two basal rays, broad or narrow, and another one along the edge of the abdominal fold. The discal band is short, obliquely extending from vein 7 to vein 3 where it nearly joins the submarginal band at an angle. The part of the submarginal above vein 4 is often much reduced.

The terminal arm of the claspers is somewhat rounded at the apex, which carries a number of strong teeth and a few smaller ones toward the base. The aedoeagus is very stout, with numerous internal spines and preapical teeth.

*Distribution.*—Type locality: Surinam.

Bogota, Colombia; St. Laurent, French Guiana; Santa Cruz, Bolivia; Manicore, Brazil, [B.]. Guatemala; Honduras; Nicaragua; Panama; Colombia to South Brazil, [G. & S.]. Colima, Mexico; Chiriqui; Muzo, Colombia, [A.M.]. Rio Songo, Bolivia; Chapada, Brazil; San Pedro Sula, Honduras, [A.N.S.].

**Phocides pigmalion** race **belus** Godman and Salvin

*Phocides belus* Godman and Salvin, Biol. Centr.-Amer., Rhopal., II, pp. 293, 294; III, pl. 76, figs. 17, 18, 1893. Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 15, 21, 1912. Draudt, Seitz Macrolep. of the World, V, p. 850, pl. 165 f, 1921.

The general form of the maculation is quite similar to that of *pigmalion* Cramer but the hyaline spots of the primaries are very large, the discal band curved on the outer edge. The bands and rays of both wings somewhat reduced.

*Belus* seems to represent a race of *pigmalion* in the more northern localities and to occasionally occur as a form farther south.

The form of the male genitalia is identically the same as that of *pigmalion.*

*Distribution.*—Type locality: Mexico.

Ventanas, Tampico, Paso de San Juan, Mexico, [G. & S.]. Mexico; Colombia (?), [B.]. Colima, Mazatlan, Mexico, [A.M.].

**Phocides pigmalion** form **hewitsonius** (Mabille)

*Erycides hewitsonius* Mabille, Ann. Soc. Ent. Belg., XXVII, (C. R., p. lii), 1883.
*Phocides hewitsonius* Draudt, Seitz Macrolep. of the World, V, p. 851, 1921.
*Pyrrhopyga pigmalion* Hewitson, Exot. Butt., II, Pyrrh., pl. 1, fig. 3, 1857.

The pattern of the maculation shown in the Hewitson figure seems to confirm his remark in the text that it represents a form of *pigmalion* with unusually large hyaline spots. The discal hyaline band is somewhat similar to that of *belus* in being curved on the outer edge. The blue basal stripe of the primaries below vein 1 and the one just above it are a little shorter than usually found in *pigmalion*, but they are entirely blue and continuous as in that species. The upper part of the submarginal band of the secondaries is reduced to two small spots, separate from the rest of the band and from each other, the discal blue band very short.

There are specimens at hand which very well agree with the figure in these characters and which are undoubtedly specifically the same as *pigmalion*.

*Distribution.*—Type locality: "River Amazon."

Santa Cruz, Bolivia; Hansa Humboldt, Brazil, [B.]. Minas Geraes, Brazil, [A.M.]. Sapucay, Villa Rica, Paraguay, [A.N.S.].

**Phocides pigmalion** race **pyres** (Godman and Salvin)

*Erycides pyres* Godman and Salvin, Proc. Zool. Soc. London, p 154, 1879.
*Phocides pyres* Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., xvi, pp. 17, 22, 1912. Draudt, Seitz Macrolep. of the World, v, p. 851, 1921.

The form of the male genitalia clearly shows that *pyres* is a race of *pigmalion* and not of *urania* as it is sometimes placed.

The ground color of the wings is very dark with a greenish sheen, and the bands and rays are of a deeper tint than in mainland specimens. The hyaline bands of the primaries are narrow and much like those of *urania*.

If this insect really occurs in Porto Rico, as mentioned by Godman and Salvin, it must be rather rare and locally distributed. Wolcott, in Insectae Portoricensis,[4] does not mention any species of *Phocides* from the Island.

*Distribution.*—Type locality: "Haiti; Porto Rico."

Petionville, Haiti, June, [B.]. San Domingo, [A.N.S.].

**Phocides perillus** (Mabille) (Pl. XIII, fig. 11; pl. XVI, fig. 25)

*Erycides perillus* Mabille, Le Naturaliste, 2nd ser., v, p. 77, fig. 3, 1888.
*Phocides perillus* Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., xvi, pp. 17, 22, 1912. Draudt, Seitz Macrolep. of the World, v, p. 850, 1921.

The hyaline discal band of the primaries is long and comparatively narrow, the apex of the lowest spot reaching nearly across interspace 1. The blue stripe below vein 1 is continuous from the base, a little paler blue in the basal half than the outer half and terminates bluntly under the discal hyaline band; the stripe above it is curved and terminates pointedly before reaching the apex of the lowest hyaline spot of the discal band. The rest of the basal rays are very strongly developed. The submarginal blue band is the same as in *pigmalion.*

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[4] Jour. Dept. Agr. Porto Rico, vii, (1), 1923.

The secondaries have the abdominal-fold narrowly edged with white; the inner basal ray very narrow; the outer one very broad, long and triangular, not touching the submarginal band; the discal band is very short, triangular; the submarginal band is composed of separate spots, beginning below vein 8 and tapering a little toward the anal angle, and is comparatively straight, and parallel with the outer margin of the wing. Beneath the abdominal-fold is striped with blue on the edge nearest to the body; the basal blue stripe begins on the costal margin and extends a little curved to the middle of vein 1 b; the discal blue band begins on the costal margin, extends parallel to the basal stripe to vein 3 where it is represented by a minute dot; the submarginal blue band is very straight and parallel to the outer margin of the wing, beginning just below vein 8 and extending to vein 1 b. All of the bands and stripes are broad and prominent.

The uncus is much longer than in *pigmalion* and the basal flanges shorter. The aedoeagus less stout and with fewer but large internal spines. The claspers terminate in two teeth, with small erosions before the apex on both dorsal and ventral edges.

*Distribution.*—Type locality: Antioquia.

Colombia, [B.]. Cauca, Colombia, [A.N.S.].

**Phocides iocularis** Rober

*Phocides iocularis* Rober, Ent. Mitteil., xiv, pp. 159, 160, 1925.
? *Phocides disparilis* Rober, Ent. Mitteil., xiv, p. 160, 1925.

Described as resembling *belus.* The basal blue rays barely indicated. The discal band of hyaline spots is small at the costal margin and less straight on both sides; the subapical band is composed of two very large and three small spots. The secondaries are deeper black than the primaries, the inner marginal area dark brown; and have three small, shining green-blue bands, the submarginal separated in the middle, the discal reaching from the fore margin to the second median branch; the inner band begins on the fore border (not from the wing base) and extends to the submedian; the inner margin is covered with green-blue scales. The blue markings beneath consist only of small blue spots.

The female differs from the male in having less shining bands of the secondaries, which begin on the subcostal; from the base of the wings are three blue-white stripes which do not reach the inner area of the wings. The ground color of the wings is duller and more uniformly black-brown, the primaries and secondaries not differing. The blue markings of the secondaries beneath are complete bands beginning at the fore border. There are on both sides of the primaries blue markings at the anal angle distal to the lowest spot of the discal hyaline band and a small sub-basal, costal blue stripe.

Not being certain that the female he described is conspecific with the male, he proposes the name "*disparilis*" for it in case it should later prove to be distinct.

*Iocularis* is placed in this division because of the comparison with *belus* but the writer is not sure that it really belongs here.

*Distribution.*—Type locality: Colombia.

*2. Primaries above with the basal ray below vein 1 composed of two parts, a short, oblique, whitish basal stripe and a longer blue stripe, usually connected in valgus and sometimes slightly separated in thermus. Secondaries beneath with the discal blue band curved, united, or almost united with the submarginal blue band, at vein 3, and forming a long curved band to near the anal angle, thus reducing the submarginal band to four spots, ending on vein 3*. . . . . . . . . . . . . . . . . . . . . . . . . . (191)

**Phocides thermus** (Mabille) (Pl. XIII, fig. 12; pl. XIV, figs. 17, 18)

*Erycides thermus* Mabille, Ann. Soc. Ent. Belg., XXVII, (C. R., p. li), 1883.

*Erycides termus* Mabille, Gen. Insect., Hesp., p. 19, 1904.

*Phocides thermus* Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 15, 16, 21, 1912. Draudt, Seitz Macrolep. of the World, V, p. 851, 1921.

The description states that the usual extra-discal hyaline spots are represented by only a small spot. The discal band reaching the border of the wing. The under side of the secondaries with an almost straight basal blue band, a longer, thin median band and a short external band, which ends near the middle of the median and touches it externally.

The specimens at hand agree very well with the description, except that in all of them there are two extra-discal spots, sometimes very narrow, and it is probable that Mabille's type is an individual in which these spots are much reduced. The basal rays of the primaries are poorly developed and sometimes absent except those lying on each side of vein 1; the two parts of the stripe lying below vein 1 are sometimes connected and sometimes a little separated, the outer part often connected with the lowest spot of the submarginal blue band at the anal angle. On the secondaries beneath the blue bands are narrow, the median band conspicuously merged with the submarginal band at vein 3 and forming with the lower part of the submarginal band a long thin band which extends to near the anal angle; the upper part of the submarginal band thus reduced to a row of four spots separated distinctly from the very long, thin median band.

All of the specimens of *thermus*, which the writer has seen, have come from the vicinity of Bogota, Colombia.

The uncus is a little shorter than in *perillus* and the aedoeagus not quite so stout. The claspers are different in shape but terminate somewhat similarly, the lower tooth more pointed and with a number of pronounced serrations on the dorsal edge.

*Distribution.*—Type locality: Bogota, Colombia.

Brazil, [M. & B.]. Bogota, Colombia, [B.]. West Cordilleras, Muzo, Colombia; French Guiana, [A.N.S.].

**Phocides valgus** (Mabille) (Pl. XIV, fig. 19; pl. XV, fig. 20)

*Erycides valgus* Mabille, Ann. Soc. Ent. Belg., xxvii, (C. R., p. lii), 1883.

*Phocides valgus* Mabille and Boullet, Ann des Sci. Nat. Paris, 9th ser., xvi, pp. 15, 21, 1912. Draudt, Seitz Macrolep. of the World, v, pp. 850, 851, pl. 161 a, 1921.

The description states that the median blue band of the secondaries beneath is long and curved, ending at the "simple posterior," and below the inner band which is broad, a little curved and almost white. The external band ends in a point on the second branch of the "posterior composition" and is divided into four spots. Mabille states that *valgus* is the only one of the four species treated in his paper, (*thermus, distans, valgus, pigmalion*), which has five or six unbroken and well marked blue rays on the upper side of the secondaries.

The specimens identified as *valgus* average a little smaller than *thermus*, the maculation heavier but of similar pattern, the outstanding feature being union of the discal band of the secondaries beneath with the lower part of the submarginal and that band being reduced to four spots above vein 3; sometimes the discal band does not quite touch the lower part of the submarginal band at vein 3 and thus exhibits a slight break in the continuity. The basal rays of the primaries are very well developed and occasionally extend nearly to the discal hyaline band. In all of the specimens at hand the two parts of the basal ray below vein 1 are connected.

The Draudt figures of *valgus* do not very well represent the species, that of the female appearing more like *perillus*.

The form of the male genitalia is the same as that of *thermus*, and in view of this and the fact that the pattern of maculation is also practically the same it is possible that they are merely forms or races of one species.

*Distribution.*—Type locality: Cayenne.

Brazil, [M. & B.]. Ecuador; Rio Songo, Bolivia; Iquitos, Peru; Manicore, Brazil, [B.]. Amazons, Brazil, [A.M.]. Rio Songo, Coroico, Bolivia; Chapada, Brazil, [A.N.S.].

*3. Primaries above with the basal ray below vein 1 formed as in Division 2 but the two parts always distinctly separated. Secondaries beneath with the blue discal band not connected with the submarginal band at vein 3*. . . . . . . . . . . . . . . . . (194)

**Phocides xenocrates** new species (Pl. XIII, fig. 13; pl. XV, figs. 21, 22)

Male. Upper side. Primaries with a discal hyaline band of four spots, the upper one a mere streak on the costal margin; two extra-discal spots and four subapical spots, the two upper ones minute. The usual longitudinal, basal blue rays are well developed, the one below vein 1 distinctly broken into two parts, the inner part oblique, bluish-white, the outer part blue. The ray above vein 1 is short, its termination well separated from the discal hyaline band. The submarginal blue band is interrupted at the extra-discal hyaline spots and again at the subapical spots.

The secondaries have the usual stripes and bands. The submarginal band is continuous and the spots are of approximately the same size. The discal band is short, heavy, pale blue and does not touch the submarginal band. The basal stripes are whitish.

Beneath. The basal rays of the primaries are absent; a short transverse stripe from the costa to vein 2; a white basal costal marginal dot; scattered blue scales bordering the spots of the discal hyaline band, a blue streak below the costal marginal spot of the discal band, the submarginal band as above or reduced; basal area brown, shading to purplish to the discal band below vein 2 and at anal angle. Secondaries with basal, discal and submarginal blue bands beginning at the costal margin; a stripe on the abdominal fold. The submarginal band is interrupted at vein 3, the upper part slightly curved; the discal band does not touch the submarginal.

Fringes with the usual black and white markings, and the head and body bear no distinguishing features from the other species in this group.

Expanse, 56 to 64 mm.

*Holotype.*—Male; Bogota, Colombia, [Collection of the author].

*Paratypes.*—6 ♂, same locality, [Collection of the author]. 3 ♂, Muzo, Colombia; 4 ♂, East Colombia; 1 ♂, Trinidad, Bolivia; 3 ♂, Coroico, Bolivia; 2 ♂, Rio Songo, Bolivia; 2 ♂, Huancabamba, Peru, [all A.N.S.].

This species most nearly approaches *valgus* in superficial appearance, in well marked specimens they may be separated by *xenocrates* having the separated stripe below vein 1 of the primaries, the shorter ray above vein 1, and on the secondaries beneath the submarginal band is entire and not composed of only four spots above vein 3.

The terminal arm of the claspers is narrow and tapering, a little rounded at the apex, with a number of small apical and dorsal serrations. The aedoeagus has a considerable number of internal spines.

**Phocides metrodorus** new species (Pl. XIII, fig. 14; pl. XVI, figs. 23, 24)

Male. Upper side. Primaries black with the usual discal, extra-discal and subapical hyaline spots, the subapical series varying from four to five, the three upper ones minute. The usual basal rays and submarginal band. The ray below vein 1 divided into two parts as in *xenocrates;* the ray above vein 1 also short; the other basal rays are well developed or much reduced, in one aberrant specimen all are absent except the one below vein 1 and that one is much reduced, the submarginal band is narrow and straight, usually passing entirely outside all of the hyaline spots, but occasionally the spot in interspace 2 is produced a little inwardly so that it projects a little under the hyaline spot in interspace 3. In some individuals there is a thin blue dash above the two extra-discal spots, near the costa.

The secondaries have the usual basal, discal and submarginal whitish and blue bands; the submarginal is narrow, often thread-like, and sometimes nearly absent, it is practically straight and unbroken; the discal band is very short and narrow and does not touch the submarginal band.

Beneath. The submarginal band of the primaries is composed of large, well separated, pale blue spots of brilliant luster. The other maculation is quite similar to that of *xenocrates*. The blue bands of the secondaries are well developed; the submarginal irregular, and slightly curved above vein 3, much broader than above and is not touched by the discal band.

Head, body and fringes similar to the allied species.

Expanse, 50 to 70 mm.

*Holotype.*—Male; Bogota, Colombia, [Collection of the author].

*Paratypes.*—2 ♂, Manicore, Brazil; 1 ♂, Santa Catharina, Brazil; 1 ♂, Massaranduba, Blumenau, Brazil; 5 ♂, Santa Cruz, Bolivia; 1 ♂, Rio Songo, Bolivia; 2 ♂, Ecuador; 8 ♂, Bogota, Colombia, [all in collection of the author]. 2 ♂, Muzo, Colombia; 2 ♂, East Colombia; 1 ♂, Coroico, Bolivia; 3 ♂, Buenavista, 75 km. south-west of Santa Cruz, Bolivia; 1 ♂, French Guiana; 1 ♂, Sao Paulo, Brazil; 4 ♂, Manicore, Rio Madeiro, Brazil, [all A N.S.].

This species most closely resembles the previously described *xenocrates*, from which it may be superficially distinguished by the submarginal blue band of the primaries being comparatively straight and passing outside of the subapical spots without touching them, and usually outside of the extra-discal hyaline spots. The discal blue band of the secondaries is somewhat more separated at the apex from the submarginal blue band. *Metrodorus* differs from *valgus*, which it also resembles, in much the same way as *xenocrates*.

This species seems to be one of the most common of the *Phocides* and has an extended geographical distribution in South America. Individuals vary considerably in size, as indicated by the expanse measurements given above. It may have been previously described under some other name but is not recognizable from any of the published descriptions.

The claspers are broad, the terminal arm contracted sharply just before the truncate apex, which has a number of very large serrations.

*4. The basal rays of the primaries on each side of vein 1 are divided into two parts by an oblique, transverse black bar.......*(196)

**Phocides distans** (Herrich-Schaffer) (Pl. XIII, fig. 15)

*Erycides distans* Herrich-Schaffer, Corresp.-blatt. des zool.-mineral. Ver. Regensb., xxiii, p. 168, 1869. (Prodr Syst. Lep , part 3, p. 60, 1869.) Plotz, Stett. Ent Zeit., xl, p. 410, 1879. Mabille, Ann. Soc. Ent. Belg., xxvii, (C. R., p. lii), 1883.

*Phocides distans* Godman and Salvin, Biol. Centr -Amer., Rhopal., ii, p. 294; iii, pl. 76, figs. 19, 20, 21, 1893. Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., xvi, pp. 16, 21, 1912 Draudt, Seitz Macrolep. of the World, v, p 850, pl. 165 c, 1921. Kaye, Memoirs Dept. Agric. Trinidad and Tobago, (2), p. 123, 1921.

*Erycides licinus* Moschler, Verh. k -k. zool -bot. Ges Wien, xxviii, p. 209, 1878. Stett. Ent Zeit , xli, p 114, 1880.

*Phocides licinus* Godman and Salvin, Biol. Centr.-Amer , Rhopal , ii, p. 731, (Suppl., 1901)

*Pyrrhopyga dysoni* Plotz, Stett Ent. Zeit , xl, p. 521, 1879.

*Erycides sigovesus* Moschler, Stett. Ent. Zeit , xli, p. 114, 1880.

*Erycides nakawara* Weeks, Psyche, xiii, p. 70, 1906. Illustr. Diurn. Lep., ii, pp 20, 21, pl. 13, 1911.

Professor Draudt has informed the writer that the figure in Seitz Macrolep. of the World is taken from the Plotz drawing of the Herrich-Schaffer type. Professor Hering of the Zoologisches Museum, Berlin, states that the type is not in their collection.

The two basal rays lying on each side of vein 1 of the primaries are divided by an oblique, transverse black bar which leaves the outer part of them as two blue spots beneath the discal hyaline band. The basal rays are well developed and brilliant. The submarginal blue band of the secondaries is usually narrow and extends in a straight line from vein 7 to near the anal angle, beneath it is much broader, begins on the costal margin and is a little curved outwardly between veins 4 and 7.

The single female specimen at hand is slightly larger than the males, the wings a little more rounded, the blue basal rays of the primaries not so well developed.

The locality "Cuba" mentioned by Plotz is probably incorrect, the writer knows of no authentic records of the species from that Island.

The figure given by Weeks for *nakawara* undoubtedly represents *distans.*

Godman and Salvin state that *licinus* Moschler is a specimen of *distans* with the head of a *Jemadia* species attached. Moschler proposed the name *sigovesus* to replace *licinus* in case that name should prove unavailable. Plotz placed his *dysoni* as a synonym of *licinus* Moschler.

The claspers terminate in two apical teeth.

*Distribution.*—Type locality, not given; of *nakawara,* Suapure, Venezuela.

Panama, [G. & S.]. Honduras; Colombia; Venezuela, [M. & B.]. St. Ann's Valley, Trinidad, [Kaye]. Honduras; Colombia, [B.]. Manicore, Rio Madeira, Brazil, [A.N.S.].

**Phocides tenuistriga** Mabille and Boullet

*Phocides tenuistriga* Mabille and Boullet, Ann. des Sci. Paris, 9th ser., xvi, pp. 16, 21, 22, 1912. Draudt, Seitz Macrolep. of the World, v, p. 850, 1921.

Described as larger but with same markings as *distans.* The extra-discal spots very narrow and thread-like. Only the lower basal rays of the primaries are well developed, and obscured in the center, the other rays almost absent. Secondaries with bluish-white rays, the discal band fairly broad and more oblique than in *distans*, and ending on vein 3. Submarginal band more or less broad and broken on vein 4. The under side of the secondaries with a straight, oblique median band, approaching very close to the submarginal band at the angle of veins 3 and 4.

Mabille and Boullet credit the name to Staudinger, but the writer has been unable to locate a description by that author.

The description might well apply to more than one species, where the maculation is reduced in some parts, and an examination of the male genitalia will be necessary to determine whether it is a distinct species or a form of one of the others. It is included in this division on account of the supposed resemblance to *distans* and may not belong here.

*Distribution.*—Type localities: Colombia, Peru, Brazil.

### *5. Maculation decidedly green*

**Phocides urania** (Doubleday, Westwood and Hewitson) (Pl. XIII, fig. 16)

*Erycides urania* Doubleday, Westwood and Hewitson, Gen. Diurn. Lep., p. 510, pl. 79, fig. 1, 1852. Skinner, Ent. News, II, p. 101, pl. 1, fig. 1, 1891. Maynard, Manual of North Amer. Butt., p. 211, pl. 10, fig. 12, 1891.

*Phocides urania* Godman and Salvin, Biol. Centr.-Amer., Rhopal., II, p. 294; III, pl. 76, fig. 22, 1893. Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 17, 22, 1912. Draudt, Seitz Macrolep. of the World, V, p. 851, pl. 165 f, 1921. Skinner and Williams, Trans. Amer. Ent. Soc., XLVIII, p. 112, 1922. Showalter, Nat. Geographic Mag., LII, (1), p. 102, pl. 8, fig. 5, 1927.

*Erycides texana* Scudder, Rept. Peabody Acad. Science for 1871, p. 47, 1872.

*Urania* is distinguished by the decidedly green maculation, other than the hyaline spots of the primaries, in which there is no suggestion of blue.

Skinner and Williams state that there is a specimen in the collection of the Academy of Natural Sciences, Philadelphia, labelled by Scudder "Texana, Type" which agrees with the Godman and Salvin figure of *urania* but not with the description of *texana*, which latter may have been based on a worn female and not noticed by Scudder as being that sex of *urania* until after the description had been published. Scudder records both *urania* and *texana* from the Pope Texas Boundary Survey and distinguishes *texana* from *urania* by the lack of greenish maculation on the upper side of the primaries and the pale dull yellowish-brown maculation of the secondaries, instead of bright green.

As noted by Skinner and Williams the record for *urania* north of the Rio Grande River is very doubtful as it has not been recorded from the United States since the original description.

The terminal arm of the claspers has at the apex a short, lower projection with a few serrations and a much longer upper projection with two serrations towards its base.

*Distribution.*—Type locality: Mexico; of *texana*, Texas.

Texas; Mexico; Guatemala, [G. & S.]. Mexico, [B.]. Jalapa, Mexico, [A.M.].

**Phocides urania race vida** (Butler) new combination

*Erycides vida* Butler, Cist. Ent., I, p. 86, 1872.

*Phocides vida* Godman and Salvin, Biol. Centr.-Amer., Rhopal., II, p. 295, 1893. Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., XVI, pp. 17, 22, 1912. Draudt, Seitz Macrolep. of the World, V, p. 851, pl. 165 f, 1921.

*Vida* appears to be the southern race of *urania* and differs in lacking the hyaline spots of the primaries, the exact position of which is clearly outlined by a black space on the wing, the rest of the green maculation remaining the same as in *urania*. The Draudt figure has the apical area too black.

*Distribution.*—Type locality: Costa Rica.

Chiriqui, Panama, [B.]. Costa Rica; Panama, [G. & S.].

It seems doubtful that the following insects placed in the genus *Phocides* really belong there.

**Phocides lincea** (Herrich-Schaffer)

*Erycides lincea* Herrich-Schäffer, Corresp.-blatt. des zool.-mineral. Ver. Regensb., xxiii, p. 168, 1869. (Prodr. Syst. Lep., part 3, p. 60, 1869)

*Phocides lincea* Godman, Ann. and Mag. Nat. Hist., ser. 7, xx, p. 150, 1907. Mabille and Boullet, Ann. des Sci. Nat. Paris, 9th ser., xvi, p. 20, 1912. Draudt, Seitz Macrolep. of the World, v, p. 851, 1921.

*Erycides grandimacula* Mabille, Ann. Soc. Ent. France, vi, Bull., 5th ser., p. cxcviii, 1876. Mabille, Gen. Insect, Hesp., p. 19, 1904.

Godman states that the Plotz drawing of the Herrich-Schaffer type looks very much like *Nascus phocus* Cramer, male, and that the drawing is marked " = *E. grandimacula* Mab." Mabille in Genera Insect. places *grandimacula* in the genus *Phocides*. Mabille and Boullet say that *lincea* pertains in all particulars to the genus *Phocides* and cannot be placed elsewhere.

The wings of *grandimacula* are described as lurid ochraceous, toward the base intermixed and striped with fuscous. The primaries with three large hyaline spots, the first one of four parts, slightly curved, broad at the costa where it is yellowish, extending to the submedian vein; the second one bipartite, oblique and broad; the third one apical, of five parts, encircling the cell end. The secondaries with a dark band in the center, bifid toward the anterior margin. Beneath the wings are paler, base of primaries yellow, marked with fuscous; secondaries golden-yellow with three fuscous bands, one at the base, the second in the center, bipartite toward the margin, the third marginal and wider. The fringes intersected with yellow. The secondaries may be dark fuscous beneath with three golden-yellow bands, one basal, the second discal, and the third submarginal, broad, and divided by the nerves. The club of the antennae black, with a hook-shaped point, but smaller than in *urania* and *pigmalion*.

The characters of maculation given in the description of *grandimacula* differ considerably from those usual in the other species of *Phocides* and perhaps after all it may belong in some other genus, possibly *Nascus* as suggested by Godman.

*Distribution.*—Type locality, of *lincea,* not given; of *grandimacula,* Brazil.

**Phocides vulcanides** Rober

*Phocides vulcanides* Rober, Ent. Mitteil., xiv, pp. 93, 94, 1925.

The description states that this insect is similar to *Jemadia vulcanus* in the maculation of the secondaries, and to *Jemadia ulyxes* (*ulixes*) in the primaries. The secondaries hardly differ from those of *vulcanus.* The description also refers to a basal and sub-basal blue band of the primaries. As mentioned previously the *Phocides* species have longitudinal rays on the primaries and the *Jemadia* species basal and sub-basal transverse bands, therefore if *vulcanides* has transverse basal bands it cannot be a *Phocides.* *Jemadia vulcanus* is a synonym of *gnetus* Fabricius and *ulixes* (not *ulyxes*) Plotz is a synonym of *hospita* Butler.

*Distribution.*—Type locality: Colombia.

**Phocides aberrans** Rober

*Phocides aberrans* Rober, Ent. Mitteil., xiv, p. 94, 1925.

This insect is described as being "in general typical of the *Jemadia* species." Color and appearance of the upper side of the primaries very much the same as in *Jemadia patrobas.* The basal and sub-basal bands are not particularly mentioned, but if the insect is typical of the *Jemadia* species they must be present, or at least there cannot be the longitudinal rays of the *Phocides,* on the primaries. Therefore the same remarks apply here as were given under *vulcanides.*

*Distribution.*—Type locality: Peru.

**Phocides jemadides** Rober

*Phocides jemadides* Rober, Ent. Mitteil., xiv, pp. 94, 95, 1925.

This insect is described as being slightly larger than *Granila paseas,* and its general appearance is indicated by its name. On the primaries a blue basal spot is mentioned and a prominent sub-basal blue band nearly parallel to the body. If it has a transverse basal and a sub-basal band it also is not a *Phocides* and the remarks under *vulcanides* equally apply here.

Both sexes are mentioned in the description.

*Distribution.*—Type locality: Bolivia.

## Explanation of Plates

### Plate XII

Fig. 1. *Phocides palemon* Cramer. Male genitalia.
Fig. 2. *Phocides lilea* Reakirt. Male genitalia.
Fig 3. *Phocides scython* Godman and Salvin. Male genitalia.
Fig. 4. *Phocides batabano* Lucas. Male genitalia.
Fig. 5. *Phocides oreades* Hewitson. Male genitalia.
Fig. 6. *Phocides oreas* Mabille and Boullet. Male genitalia.
Fig. 7. *Phocides yokhara* Butler. Male genitalia.
Fig. 8. *Phocides pialia* Hewitson. Male genitalia.

### Plate XIII

Fig. 9. *Phocides zancleius* new species. Male genitalia.
Fig. 10. *Phocides pigmalion* Cramer. Male genitalia.
Fig. 11. *Phocides perillus* Mabille. Male genitalia.
Fig. 12. *Phocides thermus* Mabille. Male genitalia.
Fig. 13. *Phocides xenocrates* new species. Male genitalia.
Fig. 14. *Phocides metrodorus* new species. Male genitalia.
Fig. 15. *Phocides distans* Herrich-Schaffer. Male genitalia.
Fig. 16. *Phocides urania* Doubleday, Westwood and Hewitson. Male genitalia.

### Plate XIV

Fig. 17. *Phocides thermus* Mabille. Male. Upper side.
Fig. 18. *Phocides thermus* Mabille. Male. Under side.
Fig. 19. *Phocides valgus* Mabille. Male. Upper side.

### Plate XV

Fig. 20. *Phocides valgus* Mabille. Male. Under side.
Fig. 21. *Phocides xenocrates* new species. Male (paratype). Upper side.
Fig. 22. *Phocides xenocrates* new species. Male (paratype). Under side.

### Plate XVI

Fig. 23. *Phocides metrodorus* new species. Male (paratype). Upper side.
Fig. 24. *Phocides metrodorus* new species. Male (paratype). Under side.
Fig. 25. *Phocides perillus* Mabille. Male. Under side.

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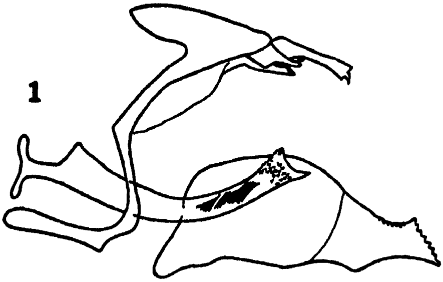

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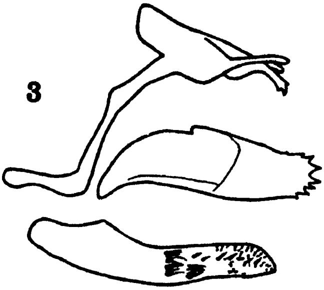

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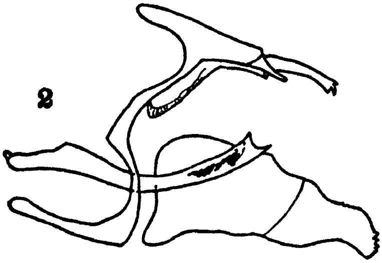

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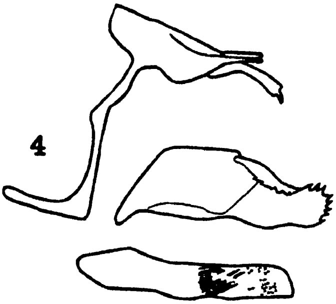

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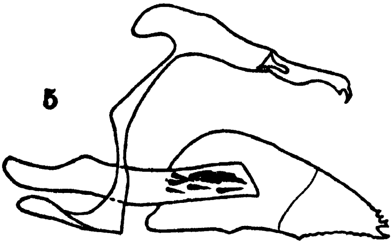

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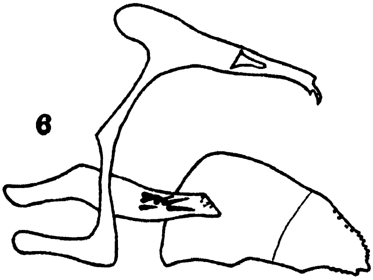

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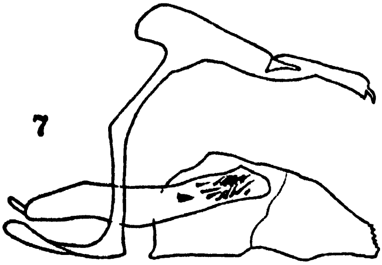

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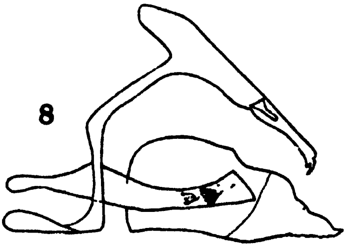

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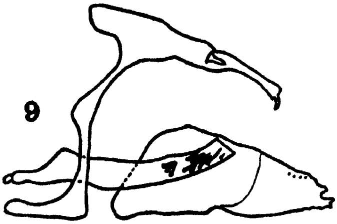

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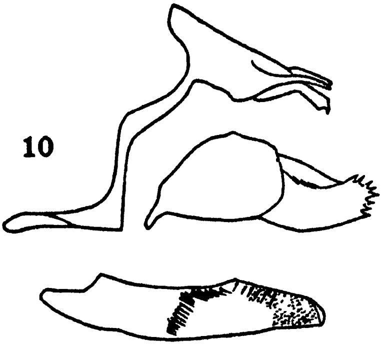

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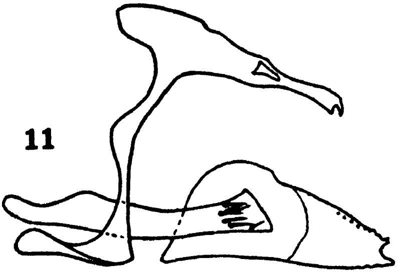

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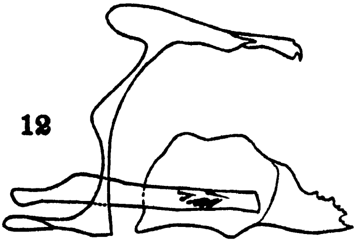

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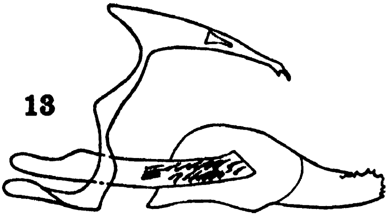

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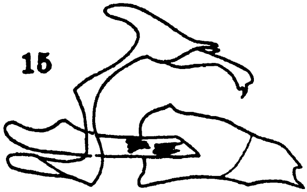

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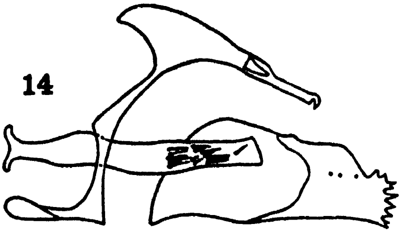

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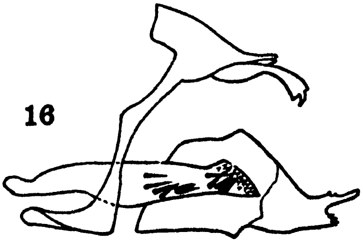

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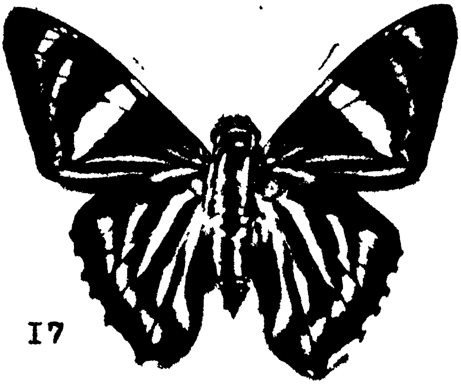

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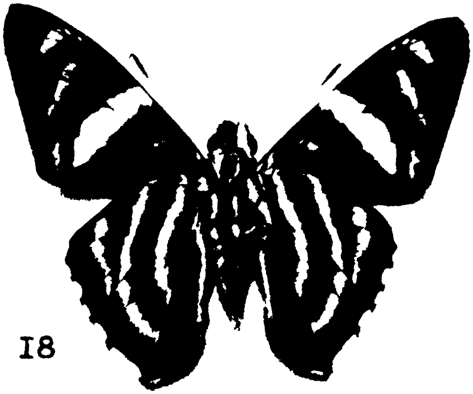

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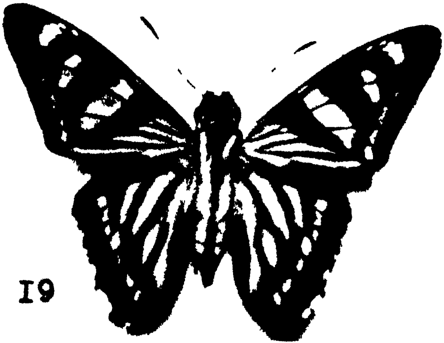

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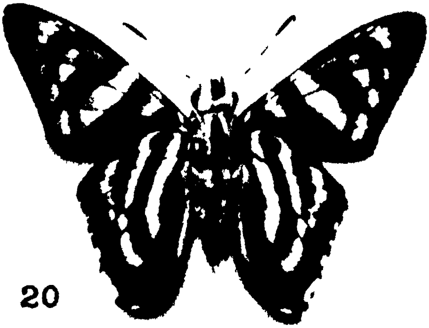

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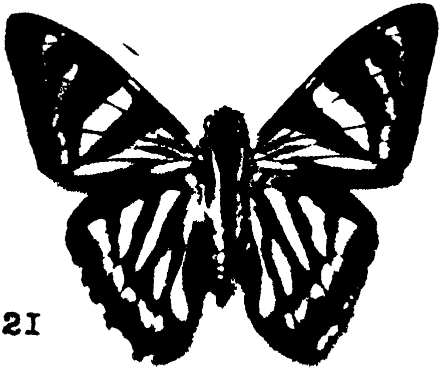

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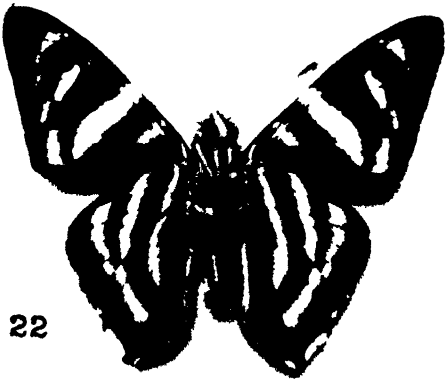

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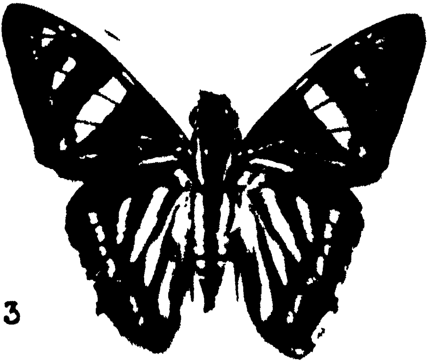

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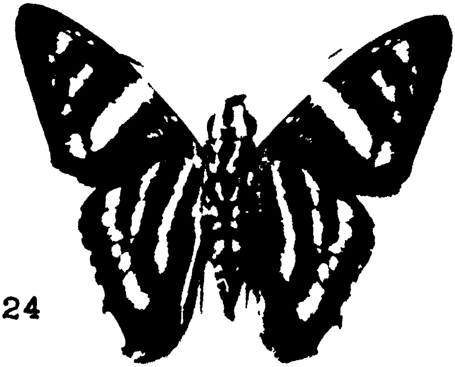

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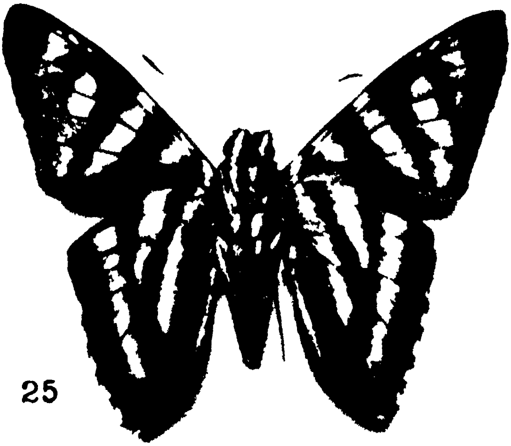

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BELL—PHOCIDES

# NEW SPECIES AND RECORDS OF MEXICAN ORTHOPTERA

BY MORGAN HEBARD

For over twenty years the Academy of Natural Sciences and the author have constantly been receiving small series of Mexican Orthoptera, and the Bruner Collection of North American Orthoptera purchased in 1911 added an important representation to the latter's collection. Some of this material has been studied, but the unreported balance has been steadily increasing. A considerable series submitted by the Mexican Government last year for determination led to the realization that the time had arrived when a general study of the Mexican forms was advisable and the present paper is the result of that work.

The Dermaptera are omitted as practically everything of importance from Mexico in our collections in that related Order has already been recorded.[1]

Only a few records of Blattidae are here given, for our previous studies have covered all but these. In the Mantidae and Phasmidae the present studies are of more value, the material here reported furnishing important data for further revisionary work, but the representation is very small compared with the families which follow and for which we are consequently able to present a much more detailed report.

The Acrididae are well represented but show clearly how very imperfect our knowledge still is of the vast Mexican fauna, found in so many areas of the widest diversity. In the Tettigoniidae and Gryllidae the same is even more evident and we have discussed each section only in as much detail as the accumulated evidence has warranted.

As a result the present study is only of decided value to the student in gathering together the widely scattered past literature on Mexican Orthoptera, in correctly associating the species in genera and groups as far as the present evidence warrants and in preparing for far more satisfactory studies based on more complete local collections, which it is hoped will be assembled in the future more carefully and more often than has in the past been possible.

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[1] Proc. Acad. Nat. Sci. Phila., 1917, pp. 231 to 250.

In considering the early literature, we of course find many scattered descriptions of species now known from Mexico. No extensive papers on the Orthoptera of this country are found until Saussure, from 1859 to 1868, published very brief descriptions of many new Mexican species in the Revue et Magasin de Zoologie. All such were subsequently more adequately analyzed excepting those of the Acrididae. It was possibly intended to do this work in the Biologia Centrali-Americana, but the Acrididae were there reported by Morse and Bruner, 1904 to 1908, without recourse to the Saussure collection now in the Museum d'Histoire Naturelle de Genève.

During the present century only the following additional systematic papers treating exclusively (or very largely) the Orthoptera of Mexico have been published, but it must be remembered that in many systematic revisionary studies Mexican species are included, giving to some of these contributions great importance in the literature under consideration.[2]

1900. Rehn. Notes on Mexican Orthoptera, with the Descriptions of New Species. *Trans. Amer. Ent. Soc.*, XXVII, pp. 85 to 99.

1901. Rehn. Remarks on some Mexican Orthoptera, with Descriptions of New Species. *Trans. Amer. Ent. Soc.*, XXVII, pp. 218 to 229.

1902. Rehn. A Contribution to the Knowledge of the Orthoptera of Mexico and Central America. *Trans. Amer. Ent. Soc.*, XXIX, pp. 1 to 34.

1904. Rehn. Notes on Orthoptera from Northern and Central Mexico. *Proc. Acad. Nat. Sci. Phila.*, 1904, pp. 513 to 549.

1917. Hebard. Notes on Mexican Melanopli. *Proc. Acad. Nat. Sci. Phila.*, 1917, pp. 251 to 275.

1921. Hebard. Mexican Records of Blattidae. *Trans. Amer. Ent. Soc.*, XLVII, pp. 199 to 220.

1923. Hebard. Dermaptera and Orthoptera from the State of Sinaloa, Mexico. I. Dermaptera and Non-Saltatorial Orthoptera. *Trans. Amer. Ent. Soc.*, XLVIII, pp. 157 to 196.

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[2] Among such are Brunner's Monographs on the Phaneropterids (1878) and Pseudophyllids (1895), Redtenbacher's (1891) and Karny's (1907) on the Conocephalids, Scudder's Revision of the Melanopli (1897), Redtenbacher's Insektenfamilie der Phasmiden (1906 to 1908) and Rehn and Hebard's revisions of a number of genera of the Tettigoniidae (1914 to 1920).

1923. Hebard. Expedition of the California Academy of Sciences to the Gulf of California in 1921. Dermaptera and Orthoptera. *Proc. Cal. Acad. of Sci.*, (4), XII, pp. 319 to 340.

1925. Hebard. Dermaptera and Orthoptera from the State of Sinaloa, Mexico. II. Saltatorial Orthoptera. *Trans. Amer. Ent. Soc.*, LI, pp. 265 to 310.

1931. Hebard. Studies in Lower Californian Orthoptera. *Trans. Amer. Ent. Soc.*, LVII, pp. 113 to 127.

In the present study three thousand three hundred and twenty-five specimens are recorded, representing one hundred and ninety-five genera, three hundred and ninety-two species and sixteen subspecies, of which eight genera, thirty-one species and one subspecies are new.

We wish to thank Dr. A. Dampf, who has submitted the material belonging to the Republic of Mexico. A. N. Caudell of the United States National Museum, L. Berland of the Museum National d'Histoire Naturelle (Paris) and Dr. T. H. Frison of the Illinois State Laboratory of Natural History have also enabled us to study important series belonging to their respective Institutions.

Probably the best known regions as far as Orthoptera is concerned are those found between Vera Cruz and Mexico City. Important collections have been studied from Baja California, Sinaloa, Jalisco, Guerrero and Oaxaca.

The northern portions of Mexico are still very little known and the records from Tamaulipas here published are consequently of particular interest. The country offers a vast field to the Orthopterist, the problems of major importance being the study of the species of high altitudes, the discovery of the southern limits of very many species the distribution of which in the United States is now comparatively well known and the number and northern limits of the Tropical species, of which there are sure to be found many more than have as yet been recorded from southern Mexico.

## BLATTIDAE

As we published on our Mexican material of this family in 1921, further data on only a small percentage of the species there found are given in the present paper.

### CHORISONEURINAE

**Chorisoneura flavipennis** Saussure and Zehntner

The male type from Atoyac, Vera Cruz, in the British Museum, shows a decurved tooth between the moderately elongate styles, as do the males we have recorded from Venvidio, Sinaloa.

**Chorisoneura mysteca** (Saussure)

Cordoba, Vera Cruz, V, 10, (L. O. Howard), 1♂, [Hebard Cln.]. Jalapa, Vera Cruz, 1♂, 2♀, [Stockholm Mus. and Hebard Cln.].

**Chorisoneura taeniata** Saussure and Zehntner

The male and two female types taken at Teapa, Tabasco, in March by H. H. Smith are in the British Museum. The male has the genitalia as here given for *flavipennis*. It is a smaller grayer insect than that species. The pronotum shows two diffused lines of darker brown, nearly parallel but diverging slightly caudad.

### ANAPLECTINAE

**Anaplecta fallax** Saussure

Cordoba, Vera Cruz, XII, 4, 1924, (A. Dampf), 1♂, [Hebard Cln.].

### PSEUDOMOPINAE

**Neoblattella brunneriana** (Saussure)

Described by Saussure from a female from the Eastern Cordillera of Mexico, we are now able to place the species, originally referred to *Blatta*, in its proper genus, through the kindness of Dr. J. Carl of the Geneva Museum, who writes that the tarsal claws are symmetrical with internal flange serrate.

The subgenital plate shows very decided convexity of the latero-cephalic margin. The pronotum is vaguely marked with a pair of elongate brown suffusions curving outward, on each side with a fleck and a dot mesad and a dot caudad just beyond their extremities.

A female from Necaxa, Puebla, in the Academy collection, evidently very closely related, is smaller with considerably more marking on the pronotal disk. Species of this genus, though readily recognizable from males, frequently can be determined from females only with the greatest difficulty.

### LATIBLATTELLA Hebard

Without much additional material the number of described valid Mexican species of this genus can not be determined. In *Latiblattella* we can definitely place the following Mexican species: *Blatta tarasca* Saussure, 1862, page 164, described from "Mexico" and recorded by us from San Luis Potosi; *Blatta zapoteca* Saussure, 1862, page 166, described from "Mexico"; *Phyllodromia vitrea* Brunner, 1865, originally described and also recorded by us from Vera Cruz; *Blatta dilatata* Saussure, 1868, p. 98, from [Orizaba] "Mexico"; *Blatta acolhua* Saussure, 1868, page 99, from [Eastern Cordillera of] "Mexico"; *Temnopteryx kaupiana* Saussure, 1872, described from Moyoapan in the Eastern Cordillera; *Blatta azteca* Saussure and Zehntner, 1893, page 43, No. 5, from Teapa, Tabasco; *Blatta alaris* Saussure and Zehntner, 1893, page 43, No. 6, from Teapa, Tabasco; *Blatta maya* Saussure and Zehntner, 1893, p. 45, from Temax, Yucatan; *Blatta chichimeca* Saussure and Zehntner, 1893, p. 46, described from Mexico, Mexico City and Cuernavaca, Morelos; *Temnopteryx nitida* Saussure and Zehntner, 1893, p. 53, from Omilteme, Guerrero at 8000 feet; *Latiblattella lucifrons* Hebard, 1917, described from southern Arizona and recorded from Baja California and Sinaloa; *Latiblattella picturata* Hebard, 1921, described from Baja California and recorded from Sinaloa.

**Latiblattella vitrea** (Brunner)

Saussure and Zehntner have already placed the male described as *dilatata* as *vitrea*. At the British Museum we noted a male from Atoyac, Vera Cruz and possibly a smaller female from Teapa, Tabasco, recorded as *acolhua* by Saussure and Zehntner in 1893 as representing *vitrea*.

So close is *alaris* of Saussure and Zehntner that we feel that it should be synonymized. The type, a female from Teapa, Tabasco, in the British Museum, is very similar to that of *azteca* except as follows. Pronotum proportionately slightly wider, arolia larger, tarsal claws more asymmetrical with the shorter extending beyond the arolium slightly less than its length to that point. Vertex paler, pronotal flecks slightly more distinct. It is evident that these differences may all be attributable to individual variation, but without series this can not be determined.

With *vitrea* Saussure and Zehntner's type of *maya* agrees so closely that we believe it to be probably also a synonym. The shortest tarsal claw, similar to that of *vitrea* on one limb, is even shorter on the others, only slightly surpassing the arolium.

**Latiblattella azteca** (Saussure and Zehntner)

We have given above the differences from *vitrea* shown by the types, two females from Teapa, Tabasco, in the British Museum. Certain it is that *azteca* is very closely related.

The tarsal claws are moderately asymmetrical, the shorter extending beyond the arolium a distance equal to its length to that point. The ultimate palpal joint slightly exceeds the preceding joint in length. The head is moderately dark reddish brown with vertex slightly paler and paling on mouth parts. The pronotal disk is reddish brown with two inconspicuous flecks of darker caudad.

**Latiblattella dilatata** (Saussure)

This insect is evidently very close to *vitrea* but definitely broader, the pronotum of the female from Orizaba, here selected as single type, being 5.2 mm. in width. The ultimate palpal joint is approximately equal in length to the preceding joint.

Saussure and Zehntner's *Blatta chichimeca* is probably a synonym. The types, males from Cuernavaca, Morelos and Mexico City, at the British Museum, agree closely with males of *vitrea* except that they are considerably broader and the ultimate palpal joint is slightly shorter than the preceding joint. The tarsal claws are as here given for the type of *alaris* (under *vitrea*).

Averaging even broader, but possibly much closer than we had supposed, is the author's *lucifrons*.

**Latiblattella zapoteca** (Saussure)

A Honduran series enables us to recognize this very large and strikingly marked species. The last palpal joint is longer than the preceding and the shortest tarsal claw does not extend as far as the apex of the arolium.

The author's *picturata* is seen to be much closer than we had supposed, differing mainly in being very much smaller, the single known female showing greater tegminal reduction. Series *from central Mexico may prove that picturata is a northern race* or a synonym of *zapoteca*, but without series this can not safely be assumed.

**Latiblattella acolhua** (Saussure)

This insect, described from a female from the Eastern Cordillera is intermediate in degree of development of the organs of flight between *vitrea* and *tarasca.* Additional material alone can determine its proper status.

**Latiblattella tarasca** (Saussure)

We noted in 1921 the possibility that *kaupiana* may be a synonym of *tarasca.*

**Latiblattella nitida** (Saussure and Zehntner)

This is a large insect with conspicuous dark markings and showing in the female distinct reduction of the organs of flight. The type was taken at Omilteme, Guerrero at 8000 feet. The shortest tarsal claw fails to reach as far as the apex of the large arolium.

**Ischnoptera rufa occidentalis** (Saussure)

Tampico, Tamaulipas, XII, 29, 1908, (in woods), 1 ♂, [Hebard Cln.].

**Ischnoptera tolteca** Saussure

Below Salta Grande, Necaxa, Puebla, VII, 16, 1926, (H. B. Baker), 1 ♀, [A. N. S. P.].

A paratypic male from Moyoapan is in the author's collection.

**Ischnoptera** sp.

Saussure recorded a male (in the British Museum, now lacking its abdomen), labelled "Mexico" and taken by Salle, as his Brazilian *castanea* in 1870 and repeated that record in 1893. In that specimen the cephalic margin of the pronotum is slightly paler than the other portions. There is a similar female from Motzorongo, Vera Cruz in the author's collection.

This species is apparently nearest *bicornuta* Hebard of the other described Mexican forms; it is certainly not *castanea,* but can not be described and named without undamaged material representing the male sex.

**Cahita nahua** (Saussure)

The author described this distinctive genus in 1923,[3] the species having been previously referred to *Ischnoptera*.

Tierra Colorado, Guerrero, 2000 feet, (H. H. Smith), 1 ♂, [British Mus.]. Teapa, Tabasco, (H. H. Smith), 1 ♀, [British Mus.].

A series from Honduras is before us and we have also seen a male from San Geronimo, Guatemala in the British Museum.

**Pseudomops septentrionalis** Hebard

Matamoros, Tamaulipas, VI, 30, 1908, 1 ♀, [Hebard Cln.].

**Pseudomops intercepta** (Burmeister)

Jalapa, Vera Cruz, 1 ♂, 1 ♀ (large; pronotal dark marking in male light and the spot cephalad divided into two suffusions; pronotal marking in female dark and suffused but the spot cephalad deeper in color laterad, joined to the dark crescent caudad by an orange brown area), [Hebard Cln.]. San José del Cabo, Baja California, 1 ♂ (very pale, pronotal markings weak and consisting of a medio-longitudinal suffusion flanked on each side by a vague spot), [Hebard Cln.]. Cuernavaca, Morelos, VIII, 1 to 6, 1921, 7 ♂, 2 ♀ (pronotal markings black, the spot cephalad fusing mesad with the crescent caudad), [Cornell Univ. and Hebard Cln.]. Cuautla, Morelos, VIII, 1929, (J. J. White), 1 ♂ (similar to Cuernavaca series), [Hebard Cln.].

In the Baja California male the sinistral style is straight and larger than in any of our other specimens. This may indicate specific differentiation, but we believe that it is merely an individual abnormality.

## BLATTINAE

**Periplaneta australasiae** (Fabricius)

Necaxa, Puebla, VIII, 12 and 13, 1921, (McDaniels), 1 ♂, [Cornell Univ.].

## EPILAMPRINAE

**Epilampra mexicana** Saussure

Central Mexico, 1 ♂, [Hebard Cln.].

## NYCTIBORINAE

**Nyctibora azteca** Saussure and Zehntner

Almoloyas, Oaxaca, XI, 1922, (J. J. White), 2 ♀, [Hebard Cln.].

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[3] Trans. Amer. Ent. Soc., XLVIII, p. 167, pl. 6, figs. 10 to 12.

Isthmus of Tehuantepec, (Damel), 2 ♂, 1 ♀, [Stockholm Mus. and Hebard Cln.].

The Oaxaca females are larger and darker than one from Matamoros, Puebla, in the author's collection.

### PANCHLORINAE

**Pycnoscelus surinamensis** (Linnaeus)

Valles, San Luis Potosi, I, 12, 1909, (from orchids), 2 ♀, [Illinois State Lab.]. Almoloyas, Oaxaca, XI, 1922, (J. J. White), 4 ♀, [Hebard Cln.].

**Panchlora cubensis** Saussure

Montemorelos, Tamaulipas, VI, 3, 1931, (A. Dampf; at light), 1 ♂, [Mex. Govt.].

### BLABERINAE

**Blaberus craniifer** Burmeister

Yucatan, (Allen), 1 ♂ (large), [Field Mus. Nat. Hist.].

### CORYDIINAE

**Paralatindia azteca** Saussure

Mexico City, Distrito Federal, X, 13, 1923, (in house), 1 ♂, [Hebard Cln ].

**Holocompsa tolteca** Saussure and Zehntner

Jalapa, Vera Cruz, 1 ♂, [Hebard Cln.].

### POLYPHAGINAE

**Homoeogamia mexicana** (Burmeister)

Atzcapozalco, VIII, 10 to 20, 1921, 2 ♂, [Cornell Univ. and Hebard Cln.].

**Arenivaga tonkawa** Hebard

Nuevo Laredo, Tamaulipas, VI, 8, 1931, (A. Dampf; at light), 1 ♂, [Hebard Cln.].

This is the first Mexican record for this species, which is widely distributed in Texas.

### OXYHALOINAE

**Plectoptera circumcincta** Saussure and Zehntner

The type in the British Museum, a female from Xucumanatlan, Guerrero at 7000 feet, has the tegmina showing solid areas of color and vermiculation weaker than in the Guatemalan *circumdata* and is also much more yellowish brown in general coloration.

## MANTIDAE

### AMELINAE

**Yersiniops newboldi** Hebard

San Lazaro, Baja California, IX, 1889, (G. Eisen), 17 ♂, 5 ♀, 11 juv., [Cal. Acad. Sci. and Hebard Cln.]. Sierra el Taste, Baja California, 1 ♂, 2 ♀, 1 juv., [Hebard Cln.]. Corral de Piedra, Sierra el Taste, Baja California, 1 ♀, [Cal. Acad. Sci.]. San José del Cabo, Baja California, 2 ♂, 3 ♀, 2 juv., [Hebard Cln.]. Lower Purissima, Baja California, IV, 1889, (C. D. Haines), 1 juv. ♀, [Hebard Cln.].

This recently described species is known only from Baja California, but is apparently the most abundant Mantid on that peninsula.

**Litaneutria ocularis** Saussure

Rodriguez, Nuevo Leon, VI, 7, 1931, (A. Dampf; at light), 4 ♂, [Mex. Govt. and Hebard Cln.]. Casas Grandes, Chihuahua, IX, 1906, (W. E. Hughes), 1 ♀, [A. N. S. P.]. Guaucan, Chihuahua, 4000 feet, VIII, 6 to 7, 1906, (P. P. Calvert), 1 large juv. ♂, [A. N. S. P.]. San Miguel, Sonora, IV, 1892, (G. Eisen), 1 ♂, [Hebard Cln.]. Sierra el Taste, Baja California, (G. Eisen), 1 ♀, [Hebard Cln.]. Santa Maria, Baja California, V, 1889, (C. D. Haines), 1 ♀, [Hebard Cln.]. San José del Cabo, Baja California, 1 ♂ (macropt.), 1 ♀ (determined as *obscura* by Scudder), [Hebard Cln.].

In 1923 we recorded this species from Baja California. The validity of the names proposed by Scudder for material from the United States remains uncertain, but we believe that *ocularis* is the only species of the genus known from Mexico.

### PSEUDOMIOPTERIGINAE

**Pseudomiopteryx infuscata** Saussure and Zehntner

Orizaba, Vera Cruz, I, 1898, (L. Bruner), 1 ♀, [Hebard Cln.]. Atoyac, Vera Cruz, XI, 1887, (L. Bruner), 1 juv. ♀, [Hebard Cln.].

### OLIGONICINAE

**Oligonicella tessellata** (Saussure and Zehntner)

An immature female from Uruapan, Michoacan, is in the Academy collection. It was recorded in 1902 by Rehn as *Liturgousa cayennensis maya*.

**Oligonicella mexicana** (Saussure and Zehntner)

Tepic, Nayarit, 1 ♂, 1 ♀, 1 juv., [Hebard Cln.].

In 1904 Rehn recorded a male from Guadalajara, Jalisco, referring it to the genus *Oligonyx.* In Giglio-Tos' Monograph of 1927 the species and also *toltecus* were incorrectly referred to *Bactromantis* (a synonym of *Stagmomantis,* established by us in 1923, at which time we had also correctly placed *Oligonyx toltecus* Saussure and Zehntner as a synonym of *mexicana*).

**Oligonyx bicornis** Saussure

Orizaba, Vera Cruz, 1893, 1 ♀, [Hebard Cln.]. Motzorongo, Vera Cruz, II, 1892, (L. Bruner), 1 ♀, [Hebard Cln.].

### OXYTHESPINAE

**Liturgousa maya** Saussure and Zehntner

San Rafael, Vera Cruz, (C. H. T. Townsend), 1 ♀, [Hebard Cln.].

### MANTINAE

Giglio-Tos' Monograph of 1927 has only made the confusion which existed previously in the genus *Stagmomantis* more involved. General monographic revision, based on detailed comparisons and eliminating the use of color characters in many cases, where such are of little or no value, must be undertaken.

It is for instance clear that *inquinata* Serville is a synonym of *carolina* as had been previously established, so that if the more brilliantly colored Mexican insect described from Vera Cruz can be recognized as a species or race, *tolteca* and not that name should be used. Likewise *wheeleri* Thomas, *ferox* Saussure and *stolli* Saussure had been correctly synonymized under *carolina* in 1925 by Werner.

Such is particularly unfortunate as there are certainly a considerable number of valid species belonging to the genus, particularly when it is noted that we have already synonymized under *Stagmomantis* a number of generic names which Giglio-Tos proposed for what he considered related genera.

**Stagmomantis nahua** Saussure

A pair of paratypes from Orizaba, Vera Cruz, is in the author's collection.

Giglio-Tos erected *Oromantis* to include this species and *vicina*. We consider the characters quite insufficient for generic separation and place that name, as well as that author's *Uromantis*, *Stauromantis* and *Auromantis* as synonymous under *Stagmomantis*.

**Stagmomantis vicina** Saussure

Almoloyas, Oaxaca, XI and XII, 1922, (J. J. White), 3 ♂, 4 ♀, 2 juv., [Hebard Cln.].

**Stagmomantis carolina** (Johannson)

Vera Cruz, Vera Cruz, (T. Heyde), 1 ♀ (green), [Hebard Cln.]. San Rafael, Vera Cruz, (C. H. T. Townsend), 2 ♀ (green), [Hebard Cln.]. Chichen Itza, Yucatan, (E. Thompson), 1 ♂, [Field Mus.].

These specimens are smaller even than the average from the United States, with marking at stigma very small. Unless *tolteca* is an environmental adaptation it would appear to be rather a distinct species than a geographic race of *carolina*, as we had previously thought to be likely. Certain it is that the extremes are found in the State of Vera Cruz.

**Stagmomantis tolteca** (Saussure)

Orizaba, Vera Cruz, (F. Sumichrast), 1 ♀, determined by Saussure, [Hebard Cln.].

**Stagmomantis californica** Rehn and Hebard

Sierra el Taste, Baja California, (G. Eisen), 1 ♂, [Hebard Cln.]. San José del Cabo, Baja California, 3 ♂, [Cal. Acad. Sci. and Hebard Cln.].

These specimens were mentioned in 1923 at the time *colorata* Hebard was described from Sinaloa, Nayarit and Baja California.

**Stagmomantis limbata** (Hahn)

Tepic, Nayarit, 2 ♂, 4 ♀ (three females green, one female brown), [Hebard Cln.]. Guadalajara, Jalisco, (D. L. Crawford), 1 ♀ (green), [A. N. S. P.].

**Phasmomantis sumichrasti** Saussure

Chichen Itza, Yucatan, (E. Thompson), 1 ♂, [Field Mus.]. Merida, Yucatan, (G. F. Gaumer), 3 ♂, [Hebard Cln.]. San Rafael, Vera Cruz, (C. H. T. Townsend), 3 ♂, [Hebard Cln.].

### ACONTIOTHESPINAE

**Acontiothespis cordillerae** (Saussure)

San Rafael, Vera Cruz, (C. H. T. Townsend), 5 ♂, 4 ♀, [Hebard Cln.]. Cordoba, Vera Cruz, (Hoege), 1 ♀, *paratype* of *mexicana;* IV, 5, 1908, 1 ♀, [Hebard Cln.]. Atoyac, Vera Cruz, XI, 1887, (L. Bruner), 1 ♂, [Hebard Cln.].

We have every reason to believe that *mexicana* is a synonym, based on the female sex originally correctly associated with the male of *cordillerae.*

Costa Rican males of *fraterna* (which species Saussure and Zehntner thought their male of *cordillerae* might represent) are very distinct.

### VATINAE

**Phyllovates chlorophaea** (Blanchard)

Monterrey, Nuevo Leon, X, 31, 1909, (J. Friesser), 1 ♀, [Field Mus.]. Chichen Itza, Yucatan, (E. Thompson), 1 ♂ (small), [Field Mus.].

**Pseudovates tolteca** (Saussure)

Four males and a female from Tacubaya, Distrito Federal, are in the Academy collection. These have all been recorded and include the type of *annectens* Rehn. From study of the description of *tolteca* we are satisfied that *annectens* is a synonym.

In the original description Rehn gave the femoral lobes of the male as "very angular." These lobes are in that specimen all evenly rounded, those of the median femora much more produced but no longer than those of the caudal femora and consequently more strongly convex. It was this original error which led Giglio-Tos in 1927 to believe *annectens* to be distinct.

**Pseudovates townsendi** (Rehn)

Known only from the female type from Zapotlan, Jalisco and a large immature female from Cuernavaca, Morelos, both in the Academy collection, this insect is seen to be close to *longicollis* (Stål) as Giglio-Tos has stated.

It differs in the female sex from that species in the shorter, broader form with decidedly broader tegminal marginal field (greatest width 4.7 mm.) and decidedly more conspicuously lobate limbs.

**Pseudovates longicollis** (Stål)

A pair from Guadalajara, Jalisco, in the Academy collection, were reported by Rehn in 1904 as *Vates townsendi.*

## PHASMIDAE

### ANISOMORPHINAE

**Anisomorpha monstrosa** new species

Largest known species of the genus, this female may be distinguished from that sex of *buprestoides* (Stoll) by the larger and heavier build, broader medio-longitudinal dark band flanked by paler bands on head, curved lines on pronotum, mesonotum and metanotum and large blotches on the abdominal tergites.

*Type.*—♀; Merida, Yucatan. (G. F. Gaumer.) [Hebard Collection, Type No. 1188.]

Very large and robust for the genus. Head longer than broad; with two decided impressions between and just above the antennal bases; ocelli absent but definitely showing longitudinal shallow impressions cephalad and a very faint linear medio-longitudinal sulcus. Antennae with inner surface of first joint longitudinally pinched proximad, succeeding joints simple. Pronotum longer than wide, surface shining, transverse sulcus decided. Mesonotum shining; armed with three pairs of minute tubercles cephalo-laterad and with (three and four) even smaller tubercles cephalad on lateral margins. Metanotum and dorsal surface of abdomen shining, except last three tergites which are thickly covered with microscopic hairs; tergites unspecialized meso-distad. Supra-anal plate convex. Operculum with base on line with that of seventh tergite, apex broadly and irregularly rounded. Limbs quite heavy; femora showing coarsely carinate margins internally and externally dorsad; deplanate laterad and there decidedly sulcate ventrad; tibiae with apices distinctly enlarged; tarsi hairy ventrad with large pulvilli, metatarsus with pulvillus distal. Arolium large.

General coloration dorsad blackish brown. Limbs, antennae and two irregular longitudinal dorsal bands (as described above) very dull ochraceous tawny. Ventral surface dresden brown, becoming darker distad on abdomen.

Length of body 87.6, length of pronotum 8.7, length of mesonotum 14.2, greatest width of mesonotum 10, length of metanotum including median segment 13, length of cephalic femur 15.2, length of caudal femur 16.8 mm.

### PSEUDOPHASMINAE

**Prisopus berosus** Westwood

Almoloyas, Oaxaca, XII, 1922, (J. J. White), 1 large juv. ♀, [Hebard Cln.].

This distinctive Central American species has been previously recorded so far north only as from "Mexico."

### HETERONEMIINAE

The superficiality of Brunner's monographic treatment of this subfamily is well shown by his omitting the species described by Kaup in 1871 and the majority of those described by Rehn. Furthermore his *Ocnophila* there described is a multitudinous composite, while the valid genera *Pseudosermyle*, *Sermyle* and *Heteronemia* were improperly suppressed.

**Pseudosermyle carinulata** (Brunner)

Desierto de los Leones, Mexico, 3000 meters, I, 25, 1925, (forested mountain of *Abies*, *Pinus*, *Quercus* etc.), 1 ♀, [Hebard Cln.]. Necaxa, Puebla, VIII, 12 and 13, 1921, (MacDaniels), 1 ♂, 1 ♀, [Cornell Univ. and Hebard Clns.].

**Pseudosermyle azteca** (Saussure)

Pine forest between Ajusco and Xitlo volcanoes, Mexico, 3000 meters, X, 7, 1923, 3 ♂, [Mex. Govt. and Hebard Clns.]. Desierto de los Leones, Mexico, 3000 meters, VII, 20, 1924, (forested mountain of *Abies*, *Pinus*, *Quercus* etc.), 1 ♀, [Hebard Cln.].

**Pseudosermyle neptunus** (Brunner)

San Pedro Martyr Mountains, Baja California, 1 ♂, 1 ♀, [Hebard Cln.]. San Lazaro, Baja California, IX, 1893, (G. Eisen), 5 ♂, 2 juv., [Hebard Cln. and A. N. S. P.]. Corral de Piedra, Sierra el Taste, Baja California, IX, 8, 1893, (G. Eisen), 5 ♂, 2 ♀, [Hebard Cln. and A. N. S. P.]. Pescadero, Baja California, IX, 1895, (G. Eisen), 1 ♂, 1 ♀, [Hebard Cln.]. San José del Cabo, Baja California, 1 ♂, 1 ♀, [Hebard Cln.].

In 1923 we recorded an immature female of this species from Angeles Bay, Baja California, as *Pseudosermyle arbuscula* (Rehn). More detailed analysis of the type of that insect and comparison with adults subsequently secured in southern California show it to be a synonym of *Pseudosermyle straminea* (Scudder), a species which is widespread in the southwestern United States and which, though unquestionably present in northern Mexico, has not as yet been taken there.

**Pseudosermyle tridens tridens** (Burmeister)

From the description we are satisfied that *Bacunculus digueti* Chopard, described in 1919, is a synonym.

Three males and five females from Cuernavaca, Morelos and three males and one immature from Iguala, Guerrero, previously recorded as *tridens*, are in the Philadelphia collections.

Kaup's *Diapheromera strigiceps* (♂) and *Bacteria cacica* (♀), described from "Mexico" in 1871, are synonyms unless (a situation which we believe to be less likely) *strigiceps* should be used for the race here recognized as *tridens elongatus*.

**Pseudosermyle tridens elongatus** (Brunner)

Tepic, Nayarit, 8 ♂, 7 ♀, [Cal. Acad. Sci. and Hebard Cln.].

A male from Tuxpan, Jalisco and two females from Guadalajara, Jalisco, which in 1904 were recorded as *tridens* by Rehn, are in the Philadelphia collections.

**Pseudosermyle strigata** (Scudder)

Tampico, Tamaulipas, XII, 1906, 1 ♂, [Hebard Cln.].

**Sermyle mexicana** (Saussure)

Both genus and species of Caudell's *Hoplilobethra tuberculata*, described in 1904, are synonyms, as shown by study of that type, a female from Brownsville, Texas, and the original description and figures of *mexicana*. Saussure assigned the species to *Acanthoderus*.

This is one of the most striking and highly specialized walkingsticks found as far north as the Brownsville region of Texas.

**Heteronemia mexicana** Gray

A male from Tabasco, determined by Saussure as this species, is in the author's collection.

Below Salto Grande, Necaxa, Puebla, VII, 23, 1926, (H. B. Baker), 1 ♂, [A. N. S. P.].

The Necaxa specimen differs in having the cerci decidedly heavier, the plate above the very small subgenital plate with a short straight finger projecting sinistrad. More material must be obtained to determine whether this indicates decided individual variation, a race, or a closely allied species.

**Heteronemia striata** (Burmeister)

An immature male from Jalapa, Vera Cruz has been recorded and is in the Academy collection.

**Heteronemia phalangiphora** (Rehn)

The male from Belize, British Honduras in the Academy collection, described in June, 1907, convinces us that *Bacunculus incongruens* Brunner is a synonym, described in August, 1907 from Vera Paz, [Guatemala], and Tabasco and Vera Cruz, [Mexico].

**Heteronemia oaxacae** new species (Pl. XVII, figs. 1 to 3)

This species is related to Brunner's *Ocnophila crudis* (female, Mexico); *Ocnophila godmani* (both sexes; Vera Paz, Guatemala (not Mexico as given)), and *Bacunculus forcipatus* (both sexes; San Salvador (not Mexico as given)), all of which are here referred to the present genus (of which *Bacunculus* is a synonym).

Females are separable from *crudis* by the median femora being lobate below, not above and the head evenly tuberculate and bidentate between the eyes. From *godmani* it is distinguished by the larger size, much more heavily tuberculate and carinate females and remarkable male genitalic specialization. The species *forcipatus* has similar male cerci but a very different poculum; it is also smaller, with median femora of the female unspecialized and other features of difference.

*Type.*—♂; Almoloyas, Oaxaca, Mexico. November, 1922. (J. J. White.) [Hebard Collection, Type No. 1191.]

Size large for the genus, form very slender. Head smooth, longer than broad, narrowing caudad; a pair of low swellings between the eyes each of which is surmounted by a small low tubercle; caudal margin of occiput with two feeble adjacent nodes mesad. Body smooth, mesonotum with a very few widely scattered weak tubercles and a very feeble medio-longitudinal carina, continued throughout the abdomen which distad shows traces of supplementary lateral carinae. Median segment decidedly widest caudad, there slightly wider than long. Seventh tergite distinctly longer than ninth and moderately inflated distad, eighth wider than long, ninth slightly longer than wide, its caudal margin weakly bilobate. Cerci longer than ninth tergite, moderately curved with slight angulation inward and downward, slightly flattened internally with a low node proximad and a broader one just before the median point, these and the distal half of this margin very thickly supplied with minute short teeth. Eighth sternite (major and basal portion of poculum) tubular and slightly swollen, bidentate distad as in *praetermissus* (Brunner); ninth very small, also but not as heavily bidentate distad and with two prominent but small rounded projections dorso-laterad fitting closely into the emargination of the curiously produced penis, the shaft of which is truncate, furnished on each side with a large broadly recurved tapering arm. Limbs very slender, unarmed.

*Allotype.*— ♀ ; same data as type. [Hebard Cln.].

Slightly larger but much less slender than male. Head weakly tuberculate, with a pair of small horns between eyes directed dorso-cephalad but caudal margin of occiput much more even than in male. Body minutely but decidedly tuberculate on pronotum and mesonotum but very weakly so caudad; mesonotum with a distinct medio-longitudinal carina, this supplemented by feeble lateral carinae on metanotum and abdomen and additional supplementary carinae faint on abdomen proximad but becoming pronounced distad. Median segment of equal width, distinctly broader than long. Seventh tergite slightly longer than eighth, much shorter than ninth which is truncate distad and broadly bilobate. Cerci very short. Ventral surface tuberculate, of abdomen quadricarinate, these carinae becoming heavier distad on distal sternites. Operculum broadly lanceolate, extending only slightly beyond base of ninth tergite. Median femora alone with a conspicuous foliaceous lobe on each ventral margin mesoproximad (these lobes reduced to feeble swellings in paratype[4]).

General coloration light brown becoming greenish distad in one pair, caudal limbs green in one male, one female entirely brown. Faint paler annuli indicated on median and caudal femora and adjacent portions of tibiae, individually more or less evident and obsolete in one female.

A pair of paratypes bearing the same data agree closely with the type and allotype in size, the latter measuring as follows: length of body ♂ 70, ♀ 74; length of mesonotum ♂ 17, ♀ 16.8; length of metanotum including median segment ♂ 13.1, ♀ 12.2; length of median segment ♂ 1.8, ♀ 2.7; length of cephalic femur ♂ 25, ♀ 19.8; length of caudal femur ♂ 24.8, ♀ 20 mm.

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[4] It is becoming increasingly evident that in many species of the Phasmidae such foliaceous lobes may vary tremendously individually. This is the case in the present species.

**Diapheromera veliei mesillana** Scudder[5]

Torreon, Coahuila, (J. Friesser), 1 ♂, [Field Mus.]. Tampico, Tamaulipas, XII, 1906, 1 ♂, [Hebard Cln.].

These males show wide extremes of size, the former being 94.3, the latter 62 mm. in length.[6] Both average slightly more slender than our Texan series.

**Diapheromera calcarata** (Burmeister)

Guadalajara, Jalisco, (D. L. Crawford), 3 ♂, 1 ♀, [A. N. S. P.].

### RHABDOCERATITES Rehn and Hebard

To this genus belong two species which are best distinguished as follows.

A. Form more slender, size apparently averaging much smaller. Head decidedly longer than width across eyes, occipital horns small. Male operculum longer and more delicate. Southern Texas and Tamaulipas. . . . . . *tamaulipensis* (Rehn)

AA. Form more robust, size apparently averaging much larger. Head not longer than width across eyes, occipital horns larger. Male operculum shorter and heavier. Extreme western Texas, southern New Mexico, southeastern Arizona and Coahuila. *covilleae* (Rehn and Hebard)

Though the description of *Diapheromera beckeri* Kaup in 1871 from "Mexico" leaves much to be decided, that species certainly belongs to the present genus.

**Rhabdoceratites tamaulipensis** (Rehn)

The originally described pair from Altamira, Tamaulipas in the Academy collection have been examined.[7]

**Rhabdoceratites covilleae** (Rehn and Hebard)

Jaral, Coahuila, XII, 1 to 3, 1919, (J. Friesser), 1 ♂, 2 ♀, [Hebard Cln.].

One female is of the usual large size (length 103.3 mm.). The other is astonishingly small (length 69.3 mm.) though otherwise in every way typical.

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[5] For this racial assignment see Hebard, Ent. News, XLII, p. 65, (1931).

[6] The median carina of the caudal femur shows distad only a microscopically toothed swelling instead of the usually very large tooth normally there present.

[7] Described in 1904 as *Diapheromera* (*Ceratites*) *tamaulipensis*, Ent. News, XX, p. 212.

## ACRIDIDAE

### ACRYDIINAE

### CRIMISODES new genus

This genus is proposed to include the single species, *undulatum*, here described. In general appearance it is nearest the South American *Crimisus patruus*,[8] though the undulation of the pronotal medio-longitudinal carina suggests the tropical American *Micronotus quadriundulatus*.[9] With that species the eyes show some projection and the intervening area moderately concave, such a condition much more highly developed in the Central American *Chiriquia*. The lateral lobes of the pronotum project distinctly as in *Crimisus*, slightly more than in *Micronotus* and much less conspicuously than in *Chiriquia*. The forking of the frontal costa is distinctly narrower than in *Crimisus* or *Micronotus quadriundulatus*, decidedly narrower than in *Chiriquia*.

It is evident that we have to deal with a genus, like *Crimisus*, probably referable to the Metrodorae, but showing strong affinity to the Acrydiiae. It would appear best to consider *Micronotus* an aberrant member of the Acrydiiae showing nearest approach to the Metrodorae.

The following characters are important. Cephalic femora carinate dorsad. Frontal costa very narrowly forked. Caudal angles of pronotal lateral lobes turned moderately outward so that they are moderately conspicuous from above, broadly rounded. Medio-longitudinal carina of pronotum elevated cephalad. Tegmina oval, much as in *Micronotus*. Vertex projecting very slightly beyond cephalic margin of eyes, in cephalic aspect weakly but distinctly concave. Median femora short and broad with dorsal margin undulate and ventral margin lobate. Caudal metatarsus distinctly longer than combined length of succeeding joints.

**Crimisodes undulatum** new species (Pl. XVII, figs. 4 and 5)

It is noteworthy that the general form of the vertex and the proportions of the caudal tarsi agree with *Acrydium arenosum*,[10] the production of the vertex being distinctly less than in that species and very slightly greater than in *Micronotus quadriundulatus*.

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[8] Compared with a male from Obidos, Brazil, in the author's collection.

[9] Compared with a large series before us.

[10] The majority of the species of *Acrydium* have the vertex produced and to some degree forming angulation mesad and the pronotum faintly to prominently

We have given the above comparisons in order that the differences between such borderland species may be better understood.

*Type.*—♂; Cordoba, Vera Cruz, Mexico. October 12, 1929. [Hebard Collection, Type No. 1209.]

In addition to the characters given above, the following are important. Size very small, slightly larger than *Micronotus quadriundulatus;* form medium, as in that species. Surface microscopically tuberculate. Vertex broad, one and one-quarter times dorsal width of eye, concave between the margins and the definite medio-longitudinal carina in cephalic portion (which carina is continued in the frontal costa, in cephalic aspect projecting prominently), its margins beginning parallel, then curving strongly to form the transverse cephalic margin. Frontal costa in profile forming an acute projecting angle with the median carina of the vertex, below this angulate emarginate at slightly over ninety degrees before a broad and prominent convexity between the antennae; forking very narrow. Lateral ocelli opposite median points on eyes, the portion of the face above about twice as broad as high. Eyes showing slight but distinct elevation. Antennae exceptionally elongate and slender as in *Crimisus*, each as long as caudal femur. Pronotum (subcaudate, extending slightly beyond caudal femur) with median carina elevated in a broad convexity cephalad, thence lower and weakly undulate becoming low and very fine caudad; dorsal surface irregularly but generally deplanate, showing no definite nodes or tubercles, cephalic lateral carinae faintly convex-convergent caudad; continuation of lateral margins as short carinae on mesozonal and prozonal portions of lateral lobes very prominent, ventro-caudal angles of lateral lobes rounded but prominent from above. Tegmina and wings present. Cephalic and median femora short and stout; the former showing a weak angulate projection of the ventro-external margin, homologous to the lobe there present in *Crimisus;* the latter with dorsal margin weakly undulate and ventral margin with two lobes distad. Caudal femora with swellings between sutures well indicated.

General coloration uniform dark brown. Tarsal joints slightly paler with apex of last joint blackish.

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tectate. In *arenosum* and its allies alone, the angulation of the vertex is weak or obsolete (its cephalic margin being nearly transverse) and the dorsum of the pronotum is nearly or definitely deplanate.

Length of body 5.8, length of pronotum 6.7, greatest width of dorsum of pronotum 1.77, width between apices of pronotal lateral lobes 2.76, length of caudal femur 4.7 mm.

This specimen was taken by beating in a deserted sugar-cane field, now overgrown with low weeds, at an elevation of 800 meters.

**Acrydium granulatum** Kirby

Colonia Garcia, Chihuahua, (C. H. T. Townsend), 1 ♂, 1 ♀, (both semi-caudate), [Hebard Cln.].

This is a widespread species in the far North, previously known to reach South at high elevations only as far as the White Mountains of New Mexico and the Arizona Plateau.

Though the genus *Acrydium* was previously unknown from Mexico, it is quite possible that another species, *acadicum acadicum* (Scudder), will be found in the northern Sierra Madre, as we have taken it (recorded as *crassum* by Rehn and Hebard in 1909) at Cloudcroft at the southern extremity of the Sacramento Mountains in New Mexico.

**Paratettix aztecus aztecus** (Saussure)

In 1924 we synonymized *Telmatettix* Hancock under *Paratettix* and *parviverticis* Hancock under *aztecus* and in 1925 reduced *hesperus* Morse to a race of the present species.

Hancock's *aridus*, described in 1902 from Palm Springs, California, is a synonym as shown by the original series in the author's collection.

So much confusion occurs in past literature that we list here all Mexican material before us, belonging to the author unless otherwise noted.

Lerdo, Durango, (Hoege), 1 ♀. Venvidio, Sinaloa, VII, 6 to 12, 1913, (J. A. Kusche), 1 ♀. El Paraiso, Baja California, V, 1889, (C. D. Haines), 1 ♂. Tepic, Nayarit, 1 ♂. Atoyac, Vera Cruz, IV, (Schumann; Smith), 1 ♂, 1 ♀. Teocelo, Vera Cruz, (O. W. Barrett), 1 ♂, [A. N. S. P.]. Cordoba, Vera Cruz, I, 1899, 1 ♂, 1 ♀. Coatepec, Vera Cruz, 1 ♂, 2 ♀, [Mex. Govt.]. Orizaba, Vera Cruz, (F. Sumichrast), 1 ♀, paratype; I, 1892, (L. Bruner), 1 ♂. Yantepec, Morelos, XI, 17, (O. W. Barrett), 1 ♀, [A. N. S. P.]. Rio Cocula, Guerrero, III, 12 and XII, 1898, (O. W. Barrett), 5 ♂, 2 ♀, type and paratypes of *parviverticis*. Rio de las Balsas, Guerrero, VII, 12, 1898, (O. W. Barrett), 1 ♀.

Acapulco, Guerrero, IX, (H. H. Smith), 1 ♂. Ocotlan, Oaxaca, III, 22, 1923, (J. J. White), 1 ♀.

**Paratettix aztecus hesperus** (Morse)

In 1923 we noted that this race appears to intergrade with typical *aztecus* in southern Baja California. More material can alone determine the limits of these races in that region.

**Paratettix minutus** (Hancock)

Compared with *aztecus* the present insect is seen to be decidedly smaller, with slightly wider vertex and weaker dorsal convexity of the pronotum, that surface being, particularly in females, more roughened and often pustulate. Morse in 1900 confused a large portion of his material with *aztecus*.

Kirby in 1910 correctly placed *minutus rugosus* Hancock as a synonym. This is confirmed by the types and original series of both in the author's collection.

Valles, San Luis Potosi, I, 26, 1909, 1 ♂, [Hebard Cln.]. San Lorenzo, Cordoba, Vera Cruz, (M. Trujillo), 1 ♀, [A. N. S. P.]. Jalapa, Vera Cruz, II, 1899, 1 ♀, [Hebard Cln]. Atoyac, Vera Cruz, IV and V, (H. H. Smith), 2 ♂, 2 ♀, [Hebard Cln.]. Orizaba, Vera Cruz, I, 1892, (L. Bruner), 4 ♂, 3 ♀, [Hebard Cln.]. Teapa, Tabasco, II and III, (H. H. Smith), 3 ♂, 1 ♀, [Hebard Cln.]. Tapachula, Chiapas, (D. L. Crawford), 1 ♂, [Hebard Cln.].

### *The Cucullatus Group of Paratettix*

This Group is distinguished by the lobate cephalic and particularly the median femora, the vertex broader than in the Aztecus Group but differing in average width in each recognizable unit.

In the eastern United States is found typical *cucullatus* Burmeister with vertex broad for the Group, dorsal surface smooth and appreciably convex and median femora elongate and, particularly in females, trilobate ventrad. In Louisiana and Texas we find a slight average narrowing of the vertex and on that condition were based Hancock's *texanus* (type a caudate male from Paige, Texas) and *texanus nanus* (type an abbreviate male from the same locality). Large Texan series convince us that the differences are too slight and subject to too much individual variation to justify recognition of those names, as Blatchley decided for the former in 1920.

Further investigations show that in specimens from the coast from Houston, Texas to Matamoros in northern Tamaulipas the vertex averages slightly but still narrower and the median femora are sometimes shorter and distinctly less lobate. This will be noted is a close approach to *mexicanus,* that insect differing from *cucullatus* in the narrower vertex, shorter and less strongly lobate femora, the median of the females usually with first lobe obsolete but second extensive though often not as sharply rounded, pronotal dorsal surface rougher and not as definitely convex, average smaller size and more graceful build. Such material is difficult to assign. It might be referred to *mexicanus* or taken as indication of intergradation between *cucullatus* and *mexicanus.* We believe it best considered *cucullatus* showing its strongest divergence from the typical condition and this toward the closely related *mexicanus.*[11]

The difficulties presented are due to the slight degrees of difference which exist coupled with decided individual variation in some features which might easily be thought to have much diagnostic value. Thus the median femora we find are sometimes much shorter in brachypterous than in macropterous specimens of the same series.

Large series before us prove that in southern Mexico there is only one species of this Group present. As in other related species both more slender macropterous and more robust brachypterous individuals are present. Careful analysis of Saussure's description of *mexicana* and *tolteca* from "Mexico calida" convinces that the former was based on the caudate, the latter on abbreviate material of this species. Thus *tolteca* falls as a synonym of *mexicana.* Kirby was correct in so placing *mexicanus abortivus* Hancock and that author's *tuberculatus* and *toltecus sonorensis* must share the same fate as shown by the types in the Hebard collection, the former a caudate female from Vera Cruz, the latter a caudate female from Cordoba, Vera Cruz.

In northwestern Mexico and the western United States is found a highly variable member of this Group. For it the name *toltecus* has generally been used. It has been distinguished from *mexicanus* by the usually broader form, slightly wider vertex and usually more conspicuous femoral lobes. Though very close we believe it best to consider it a race of *mexicanus*. Not only is a series before us from Cuernavaca, Morelos, apparently *mexicanus*, showing a strong tendency toward it (as we noted in 1929) but often in material from the southwestern United States a tendency toward *mexicanus* is to be found. The first available name for this race of *mexicanus* is *extensus* Morse, for which the type has been selected, a female from San Bernardino, California. The synonyms of *mexicanus extensus* Morse are Hancock's *morsei*, *toltecus arizonus* and *robustus*, assigned by us as synonyms of *toltecus* in 1929.[12]

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[11] We placed Brownsville material as *mexicanus* in 1929.

From Guatemala to Panama we have material very closely resembling *mexicanus* but with femoral lobes usually decidedly more produced and a greater elevation of the pronotal median carina present cephalad, often accompanied by greater rugosity of the dorsal surface. The name *fallax* Bolivar is apparently available, based on a brachypterous female from Guatemala. The insect certainly represents nothing more than a race of *mexicanus*. All previous records by Rehn or the author of *toltecus* from that region are based on such material, but the Colombian specimens so recorded by the author are distinct.

As so much confusion in this Group has occurred, we record below all the Mexican material before us, belonging to the author's collection unless otherwise noted.

**Paratettix cucullatus** (Burmeister)

Matamoros, Tamaulipas, VI, 22, 1895, 1 ♂ (caudate).

This male shows divergence toward *mexicanus* as strongly as in any of our series from Brownsville, Texas.

**Paratettix mexicanus mexicanus** (Saussure)

Hancock's *mexicanus abortivus* and *toltecus sonorensis* are established synonyms and *Paratettix tuberculatus* Hancock, based on a small caudate female, is here added to this synonymy. The types of all of these are in the author's collection.

Vera Cruz, Vera Cruz, 2 ♂, 1 ♀ (caudate); I, 1899, 1 ♀ (caudate). Los Cocos, Vera Cruz, XI, 10, 1923, (from A. Dampf), 1 ♀ (caudate). Medellin, Vera Cruz, (Smith; Heyde), 1 ♂, 1 ♀ (caudate). Coatepec, Vera Cruz, 3 ♂ (two abbreviate, one caudate), [Mex. Govt.]. Soledad, Vera Cruz, I, 1899, 2 ♂

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[12] Proc. Acad. Nat. Sci. Phila., LXXXI, p. 321.

(one caudate, one subcaudate). La Antigua, Vera Cruz, I, 1899, 1 ♂ (caudate, with pale pronotal saddle). San Rafael, Vera Cruz, (C. H. T. Townsend), 14 ♂, 11 ♀ (thirteen males, seven females caudate, others abbreviate). Atoyac, Vera Cruz, (Schumann; Smith), 3 ♂, 2 ♀ (one female caudate, others abbreviate, one male pale pronotal saddle). Jalapa, Vera Cruz, II, 1899 and IX, 2 ♂, 3 ♀ (males caudate, females abbreviate). San Lorenzo, Cordoba, Vera Cruz, (M. Trujillo), 1 ♂ (abbreviate). Cordoba, Vera Cruz, I, 1899, 1 ♂, 1 ♀ (caudate); X, 12, 1929, 2 ♂ (abbreviate). Orizaba, Vera Cruz, I, 1892, (L. Bruner), 3 ♂, 4 ♀ (two males caudate, others abbreviate); XII, 1887, (Smith and Godman), 1 ♀ (caudate). Colima, 1 ♀ (abbreviate), [Mex. Govt.]. Uruapan, Michoacan, III, 12, 1899, (S. N. Rhoads), 1 ♀ (femora atypical, more lobate), [A. N. S. P.]. Rio Cocula, Guerrero, III to XII, 1898, 5 ♂, 6 ♀ (one male, two females abbreviate, others caudate; femora atypical, more lobate). Rio de las Balsas, Guerrero, VII, 12, 1898, 1 ♀ (femora atypical, slightly more lobate). Teapa, Tabasco, I to III, (H. H. Smith), 5 ♂, 1 ♀ (one male abbreviate, others caudate). Isthmus of Tehuantepec, 1 ♂ (caudate), [Mex. Govt.].

It will be noted that the western material approaches *fallax* and *extensus* in the lamellation of the lobes of the cephalic and median femora.

The following series is atypical, but in this case is plainly almost intermediate between typical *mexicanus* and *mexicanus extensus*.

Cuernavaca, Morelos, I to IX, (Smith; Deam), 5 ♂, 6 ♀ (all abbreviate), 1 juv. ♀.

**Paratettix mexicanus extensus** Morse

Villa Union, Sinaloa, IX, 27, 1918, (J. A. Kusche), 1 ♀ (abbreviate). Rosario, Sinaloa, (J. A. Kusche), 2 ♀ (abbreviate). San José del Cabo, Baja California, 1 ♂, 7 ♀ (one female caudate, others abbreviate). Guadalajara, Jalisco, (D. L. Crawford), 1 ♂, 1 ♀ (abbreviate; showing slight tendency toward *mexicanus mexicanus*), [A. N. S. P.].

**Paratettix frey-gessneri** Bolivar

In 1924 we first recorded this Antillean species from the mainland and we now find that it there ranges from Texas to Panama.

Not only is *Merotettix* Morse a synonym of *Paratettix*, but his *pristinus* (1899) is a synonym of the present species, as shown by paratypes in the author's collection. Moreover that author's Mexican *Tettix convexus*, *Tettix? tectus*, *P. sinuatus* (renamed *saevus* by Kirby) and *P. durus* are additional synonyms and also Hancock's *Apotettix eurycephalus* and *Apotettix eurycephalus brevipennis* described from Paige, Texas, as shown by the types of all of these in the author's collection. Finally Hancock's *Apotettix*, with genotype *convexus*, falls as a synonym of *Paratettix*.

The width of the vertex is subject to decided individual variation. In the Paige, Texas series both the normal and a decidedly wider vertex are found. Only in the specimens here recorded from Mexico City is the vertex as wide as in the latter; we would have believed that these represented a distinct race had not the Texan series shown this feature to be individually so variable.

Had Morse had adequate series before him we are confident that he would not have described so many synonyms. The vertex does not project in any as much as in *Acrydium* (his *Tettix*), to which genus he hesitantly referred material, that error resulting in two synonyms. It is also evident that differences now known to be usual between abbreviate and caudate material further misled him.

It is true that the widest vertex as well as the smallest eye is found in the Mexico City series. This may indicate incipient racial differentiation at that high altitude, but probably insufficient to warrant nominal recognition when the decided variation found in the species is noted.

Tampico, Tamaulipas, XII, 29 and 30, 1908, (marsh and in weeds), 2 ♂, 1 ♀ (caudate), [Illinois State and Hebard Cln.]. Tamos, Tamaulipas, (R. K. Nabours), 9 ♂, 3 ♀ (all caudate). Vera Cruz, Vera Cruz, I, 10, 1927, 1 ♂ (caudate); XI, 1887, (L. Bruner), 1 ♂ (caudate). Los Cocos near Vera Cruz, XI, 10, 1923, (from A. Dampf), 1 ♂ (caudate). Coatepec, Vera Cruz, 1 ♂, 1 ♀ (male caudate, female abbreviate). San Rafael, Vera Cruz, (C. H. T. Townsend), 4 ♂ including two paratypes of *sinuatus*, 1 ♀ (pair abbreviate, others caudate). Medellin, Vera Cruz, (T. Heyde), 2 ♂ type and paratype of *durus* (caudate). Jalapa, Vera Cruz, II, 1899, (O. W. Barrett), 1 ♂ (caudate). Cordoba, X, 12, 1929, 1 ♂ (abbreviate). Guanajuato, XII, 11, 1898, (C. C. Deam), 1 ♂ type of *sinuatus* (abbreviate). Distrito Federal, 1 ♂, 1 ♀ (caudate, pustulate dorsum), [Mex. Govt.]; V, 1888, (H. H Smith), 1 juv.; XI, 1887, (L. Bruner), 1 ♂, 3 ♀, including caudate male type of *convexus* and abbreviate female type of *tectus*. Ayutla, Guerrero, IV, 11, 1898, 2 ♀ (one caudate, one abbreviate), 3 juv. ♀.

**Clypeotettix schochii** (Bolivar)

Orizaba, Vera Cruz, 1 ♂ (small), [Hebard Cln.]. Ocotlan, Oaxaca, III, 20 to 23, 1922, (J. J. White), 2 ♂, 6 ♀, [Hebard Cln.].

**Ochetotettix barretti** (Hancock)

In 1923 we placed Morse's *volans* as a synonym. That author was again misled by features often accompanying dimorphism.

A brachypterous pair, including the type of the species, and three caudate females, paratypes of *volans*, are in the author's collection.

**Tettigidea spicatoides** new species (Pl. XVII, fig. 6)

This insect is evidently closely related to *T. spicata* Morse, a species of the salt marshes of the southeastern United States. Very similar in general appearance, it differs in the slightly longer and slightly less coarse oblique marginal carinae of the vertex (which are similarly suddenly terminated just before reaching the median carina) and the obtuse-angulate convex (instead of spicate) cephalic margin of the pronotum. The size, form, pale palpi and longitudinally evenly rugoso-carinate dorsum of the pronotum are identical in these species.

From *chichimeco* it is distinguished by the shorter marginal carinae of the vertex which do not become weaker toward the median carina, the less produced cephalic margin of the pronotum, the network of longitudinal elevations on the dorsal surface of the pronotum instead of definite longitudinal ridges and its prominent medio-longitudinal carina which shows much fainter arcuation.

*Type.*—♀; La Forestal, Vera Cruz, Mexico. January 15, 1927. (A. Dampf.) [Hebard Collection, Type No. 1211.]

Size medium, form graceful for the genus. Vertex advanced in front of the eyes, its lateral bounding carinae coarse, oblique, suddenly subsiding completely just before the median carina; greatest dorsal width of eye about three-quarters greatest width of vertex (between bases of its lateral carinae). Pronotum caudate; cephalic margin of disk broadly rounded but with obtuse angulation indicated; dorsal surface weakly convex in transverse section, appearing evenly rugoso-carinate, these elevations forming a strongly longitudinal network without trace, however, of definite longitudinal supplementary carinae; medio-longitudinal carina distinct but not conspicuous. Caudal femora considerably more elongate and slender than in *chichimeca*.

General coloration blackish brown. Tegmina with a small, oblique whitish marking distad. Palpi brown in type and immature female bearing the same data, but with the two distal joints whitish in the similarly labelled female paratype.

The measurements of the type are given first. ♀; length of body 12.8 and 12; length of pronotum 14.7 and 14.7; greatest dorsal width of pronotum 3.2 and 3.2; distance wings surpass pronotum 1.6 and 1.8; length of caudal femur 7.9 and 7.9 mm.

These specimens were taken in a marsh. It is quite probable that *spicatoides*, like *spicata*, is a species restricted in distribution to salt marshes.

**Tettigidea chichimeca** (Saussure)

Atzcapotzalco, Distrito Federal, VII, 5 to 31, 1921, 1 ♀ (abbreviate), [Hebard Cln.]. Puebla, 1912, (A. Gineste), 1 ♀ (caudate), [Hebard Cln.].

**Tettigidea bruneri** Morse

Orizaba, Vera Cruz, (Sumichrast), 1 ♀ (abbreviate), [Hebard Cln.].

**Tettigidea nicaraguae** Bruner

The type of this species, a caudate male from Nicaragua, and that of *jalapa* Hancock, a caudate male from Jalapa, Vera Cruz, both in the author's collection, when compared show conclusively the synonymy of the latter. It is quite possible that Hancock overlooked the description of *nicaraguae*.

In 1901 a caudate female from Cuernavaca, Morelos, was recorded by Rehn as *chichimeca*. It is probable that Morse's *plagiata*, described that year from that locality, is another synonym.

Huichol Territory, Sierra de Nayarit, Jalisco, 1900, (L. Diguet), 1 ♀ (caudate), [Hebard Cln.]. Coatepec, Vera Cruz, 1 ♂, 1 ♀ (both caudate), [Mex. Govt.].

**Tettigidea australis** Hancock

The male type of *australis* from Cuernavaca, Morelos and a paratype of *parvula* Morse from the same locality in the author's collection show the synonymy of the latter. Morse had probably not seen Hancock's description of *chichimeca australis* described in 1900 at the time he diagnosed *parvula*, the description of which appeared in 1901.

Cuernavaca, Morelos, (W. L. Tower), 1 ♀ (caudate), [Hebard Cln.]; IX, (O. W. Barrett), 1 ♀ (abbreviate), [A. N. S. P.].

**Tettigidea tecta** Morse

Eslava, Distrito Federal, (O. W. Barrett), 1 ♂ (abbreviate), [A. N. S. P.]. Distrito Federal, 2 ♀ (abbreviate), [Hebard Cln.].

### ACRIDINAE

**Radinotatum minimipenne** (Caudell)

Tampico, Tamaulipas, XII, 1906, 3 ♂, 3 ♀, [Illinois State and Hebard Cln.].

**Mermiria maculipennis maculipennis** Bruner

Jiminez, Chihuahua, (Rocha), 1 ♂, [Mex. Govt.].

**Truxalis brevicornis** (Johannson)

Tampico, Tamaulipas, XII, 1906, 2 ♂, [Illinois State and Hebard Cln.]. Coatepec, Vera Cruz, 1 ♂, 2 ♀, [Mex. Govt.]. Medellin, Vera Cruz, IX, 1895, 1 ♀, [Mex. Govt.]. Necaxa, Puebla, 1370 to 1400 meters, VII, 27 and 28, 1926, (H. B. Baker), 6 ♂, 1 ♀ (green), [A. N. S. P.]. San Juan Bautista, Tabasco, VII, 1 ♀, [Mex. Govt.]. Isthmus of Tehuantepec, 2 ♂, 1 ♀, [Mex. Govt.].

**Bootettix argentatus** Bruner

Jaral, Coahuila, XI, 1 to 3, 1909, (J. Friesser), 4 ♀, [Field Mus.].

**Pedioscirtetes maculipennis** (Bruner)

We published the synonymy of the genus *Acrocara* in 1925.

Ochoa, near Tampico, Vera Cruz, VII, 6, 1908, 1 ♂, [Hebard Cln.].

**Machaerocera mexicana** Saussure

Valles, San Luis Potosi, I, 6, 1907, 1 ♂, [Illinois State]. Coatepec, Vera Cruz, 17 ♂, 9 ♀, [Mex. Govt.]. Jalapa, Vera Cruz, 4400 feet, X, 12, 1906, (P. P. Calvert), 2 ♂, 3 ♀, [A. N. S. P.]. Santa Lucrecia, Vera Cruz, X, 1922, (J. J. White), 1 ♀, [Hebard Cln.]. Cuernavaca, Morelos, VIII, 19, 11, 1 ♂, 1 ♀, [Mex. Govt.]. Isthmus of Tehuantepec, 2 ♂, 2 ♀, [Mex. Govt.].

We commented fully on this variable species and established its synonyms in 1925.

**Syrbula admirabilis** (Uhler)

Texcoco, Mexico, 1 ♀ (green), [Mex. Govt.].

A pair from Guadalajara, Jalisco, was recorded as the synonym *pacifica* Bruner by Rehn in 1904.

**Syrbula montezuma montezuma** (Saussure)

This species was described from a male from "Mexico." In 1904 Bruner described *robusta*, based on a female from Ventanas, Durango, which name we consider a synonym.

Venvidio, Sinaloa, VIII, 1918, (J. A. Kusche), 2 ♂, 1 ♀, [Hebard Cln.]. Cuernavaca, Morelos, (D. L. Crawford), 9 ♂, [A. N. S. P.]; 1928, (Chambert), 1 ♂, [Mex. Govt.]. Iguala, Guerrero, IX, (O. W. Barrett), 1 ♂, [A. N. S. P.]. Guerrero, (O. W. Barrett), 1 ♂, 1 ♀, [A. N. S. P.]. Soledad, Vera Cruz, IX, 15, 1924, 1 ♂, [Hebard Cln.].

**Syrbula montezuma eslavae** Rehn

Rehn in 1900 recorded a pair from Eslava, Distrito Federal at 8000 feet, describing the male as *eslavae* and recording the female as *valida*. It certainly does not merit specific recognition but is a highland race, smaller and more stocky than typical *montezuma*, with tegmina reduced and immaculate in the females.

Eslava, Distrito Federal, 4 ♂, 2 ♀, including type of *eslavae*, [A. N. S. P. and Hebard Cln.]. La Joya, San Luis Potosi, VIII, 10, 1903, (M. E. Hoag), 1 ♂, 1 juv. ♀, [A. N. S. P.].

Two males and a female from Cuernavaca, Morelos show a distinct tendency toward the lowland insect; they were probably taken at a higher elevation than the males here referred to *montezuma montezuma*.

## OAXACELLA new genus

This genus is based on the single species *whitei* here described, genotype by monotypy. It is apparently nearest *Ochrotettix*, the single known species of which is the Mexican *salinus* (Pl. XXI, fig. 2). These genera agree in the lateral foveolae being invisible from above; the convex fastigium with narrowly flattened margins; ensiform antennae; pronotum not sellate; tegmina greatly reduced, represented by rounded pads; internal spurs of caudal tibiae equal; flat prosternum, and pronotal metazona about two-thirds as long as prozona.

From *Ochrotettix* we find that *Oaxacella* differs very widely in the cruciform pronotal lateral carinae; much less retreating face; short antennae; fastigium without a distinct median carina; pronotal lateral lobes with dorsal length slightly (instead of much) greater than depth, and shorter and broader tegmina and caudal femora.

**Oaxacella whitei** new species (Pl. XVII, fig. 7; pl. XXI, fig. 1)

The general appearance of this species strongly suggests a brachypterous species of the Cyrtacanthacrid genus *Phaeoparia*.

*Type.*— ♀; Almoloyas, Oaxaca, Mexico. November, 1922. (J. J. White.) [Hebard Cln., Type No. 1193.]

Size medium large, form moderately robust for this section of the Acridinae. Fastigium and occiput with irregular transverse rugae and a medio-longitudinal carina merely suggested; dorsum of the pronotum with the former weaker and latter distinct, weak lateral carinae strongly divergent both cephalad and caudad. Frontal costa shallowly impressed between lateral carinae; wide between antennae, there narrowing and thence widening evenly ventrad; lateral carinae of face as prominent. Caudal margin of pronotal disk truncate, showing a trace of median emargination. Tegmina rounded, truncate, slightly longer than wide, separated by a narrow interspace; two adjacent pairs of longitudinal veins evident, the balance forming a coarse network. Ovipositor valves very short.

General coloration sayal brown. Antennae proximad with narrow whitish lateral margins. Caudal femora with very small dark specks, apparently paler on external pagina ventrad and with external portion of ventral surface darker with very numerous and exceedingly small dark specks.

Length of body 28.7, length of pronotum 6, exposed length of tegmen 4.8, width of tegmen 3.8, length of caudal femur 16, width of caudal femur 4.7 mm.

**Opeia imperfecta** Bruner

Matamoros, Tamaulipas, VI, 23, 1908, 1 ♀, [Hebard Cln.].

**Opeia mexicana** Bruner

San Juan Teotihuacan, Distrito Federal, 7500 feet, IX, 5, 1926, (H. B. Baker), 1 ♂, [Univ. of Penna.].

This, the first male to be recorded, is easily distinguished from this sex of *imperfecta* by the more produced vertex and truncate caudal margin of the pronotal disk. Though in the female type in the author's collection the tegmina are attingent pads with narrow, sharply rounded apices, these organs reach the base of the supra-anal plate in this male.

The type of *Opeia palmeri* Bruner, a female from Sierra San Miguelito, San Luis Potosi, Mexico, is seen to represent the same species, as Bruner originally suggested, and that name is therefore placed in synonymy here.

**Amblytropidia mysteca** (Saussure)

Guadalajara, Jalisco, (D. L. Crawford), 4 ♂, 3 ♀ (small), [A. N. S. P.]. Coatepec, Vera Cruz, 1 ♂, [Mex. Govt.]. Cuernavaca, Morelos, XII, 1910, 1 ♂ (large), [Mex. Govt.].

The dorsum of the abdomen is yellowish buff in all but the Coatepec male, in which this area is brazil red. The ventral surface is yellowish buff in all.

**Amblytropidia elongata** Bruner

Guadalajara, Jalisco, (D. L. Crawford), 1 ♀ (much larger than this sex of *mysteca* at this locality), [A. N. S. P.]. Cuernavaca, Morelos, IX, 1900, (O. W. Barrett), 1 ♀, [A. N. S. P.].

The latter specimen was recorded by Rehn as *ingenita* (a synonym of *mysteca*) and so diagnosed in his key in 1904, at which time a male was correctly recorded from Tuxpan, Jalisco, but listed as a female. The type, a female from Tepic, is in the author's collection.

**Amblytropidia bruneri** new species (Pl. XXI, fig. 3)

This species is based on the unique male assigned with uncertainty by Bruner to his *magna* at the time (1904) that species was described. It agrees closely in size and form with males of *magna* now before us, but differs widely in the much broader fastigium, frontal costa with sulcation extending further dorsad, more rounded fastigio-facial angle, shorter antennae, presence of a weak intercalary tegminal vein and pallid coloration.

From *pulchella* here described it differs similarly in fastigium, fastigio-facial angle, presence of intercalary tegminal vein and coloration and still further in its larger size, more elongate form and principal sulcus of pronotum considerably instead of distinctly caudad of the middle, but the sulcation of the frontal costa is similar.

All of these species differ from *mysteca* (Saussure) in having the fastigium considerably less blunt and its marginal and mediolongitudinal carinae pronounced.

Close relationship to the Panamanian *insignis* Hebard (Pl. XXI, fig. 4) is evident. That insect is intermediate between *bruneri* and *magna* in form of fastigium, but distinctly less elongate than either.

*Type.*—♂; Medellin, Vera Cruz, Mexico. (Rev. T. Heyde.) [Hebard Collection, Type No. 1186.]

Size large for the genus, form elongate. Head with frontal costa broad with margins parallel, shallowly sulcate to between antennae and thence with two impressed lines extending half way to dorsal extremity (as in *insignis*). Fastigium decidedly projecting for genus, broader than long (as broad as long in *insignis*); lateral and median carinae decided. Eyes large and prominent. Antennae elongate but considerably shorter than the very elongate caudal femora. Pronotum with disk roughened and impresso-punctate; sides parallel; caudal margin obtuse-angulate produced; principal sulcus considerably caudad of middle, median carina decided. Tegmina and wings fully developed, almost reaching apices of caudal femora. Distal portion of abdomen normal (as in *insignis*). Caudal femora very elongate and moderately robust proximad. Caudal tibiae with thirteen external spines.

Length of body 22.8, length of pronotum 4.8, width of pronotum 2.2, length of tegmen 18, length of caudal femur 15.4, width of caudal femur 3.2 mm.

This specimen is possibly much discolored. Generally saccardos umber becoming light ochraceous tawny on caudal femora, the apices of these and bases of caudal tibiae suffused with blackish brown.

**Amblytropidia pulchella** new species (Pl. XXI, fig. 5)

1904. *Amblytropidia auriventris* Bruner (in part, not of McNeill, 1896), Biol. Cent.-Amer., Orth., II, p. 65. [♂; Atoyac, Vera Cruz, Mexico.[13]]

It was clearly this species which Bruner diagnosed as *auriventris* in 1904. Close relationship to the Panamanian *insignis* Hebard (Pl. XXI, fig. 4) is shown and *pulchella* may indeed represent merely a northern geographic race of that species, differing in averaging smaller, with vertex slightly narrower, pronotal disk proportionately narrower and antennae and caudal limbs proportionately shorter. The abdomen in both is red or orange above, usually conspicuously suffused with brown on the sides and yellowish below.

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[13] The Orizaba males, including the type of *auriventris*, represent *mysteca* (Saussure) as Rehn correctly indicated in 1902.

When compared with *magna* we find *pulchella* to be much smaller and much less elongate, with shorter eyes and pronotum and much shorter antennae and caudal femora. In *magna* the abdomen is reddish dorsad, gradually paling but still showing a reddish tinge ventrad.

*Type.*—♂; Atoyac, Vera Cruz, Mexico. December, 1887. (L. Bruner.) [Hebard Collection, Type No. 1187.]

Size small, form robust for the genus; as small as and averaging slightly more robust than the smallest specimens of *mysteca* (Saussure) before us. Head with frontal costa as here described for *bruneri*. Fastigium similar but narrower, as long as broad. Eyes large and prominent, definitely shorter than in *bruneri*. Antennae considerably shorter than in *magna* or *bruneri*. Pronotum with disk roughened but not impresso-punctate, sides parallel, caudal margin obtuse-angulate produced, principal sulcus distinctly caudad of the middle, median carina decided. Tegmina and wings reaching genicular areas of caudal femora as in *magna*. Distal portion of abdomen as in the allied species. Caudal femora short and robust.

The measurements of the type are followed by those of the largest Atoyac male paratype. Length of body 17.3 and 19, length of pronotum 3.8 and 4, width of pronotum 2.1 and 2.2, length of tegmen 13 and 14.6, length of caudal femur 12 and 13, width of caudal femur 2.8 and 2.9 mm.

Head, pronotum and sides of thorax dull, dark ivy green; face and limbs paler; caudal femora buffy dorsad, laterad gradually changing from dresden brown to ochraceous orange (carnelian red in male from Sumidero) ventrad; apices and bases of caudal tibiae blackish. Tegmina uniform chestnut brown. Abdomen dorsad apricot orange (in Sumidero male scarlet), sides broadly suffused with brown, ventrad light orange yellow.

*Specimens Examined.*—6; 6 males.

VERA CRUZ: Atoyac, XII, 1887, (L. Bruner), 4 ♂ type and paratypes, [Hebard Cln.]. Cordoba, 850 meters, IX, 7, 1926, (H. B. Baker; in weeds and brush on limestone hills, Las Tortolas), 1 ♂ paratype, [A. N. S. P.]. Sumidero, XI, 13, 1927, 1 ♂ paratype, [Mex. Govt.].

**Amblytropidia magna** Bruner

Santa Lucrecia, Isthmus of Tehuantepec, Vera Cruz, X, 1922, (J. J. White), 1 ♀, [Hebard Cln.].

A large Honduranian series of this large and handsome species is also before us. It was described from Panzos, Vera Paz, Guatemala. It was not previously known from Mexico as the male from Medellin, Vera Cruz, so recorded represents the species here described as *bruneri*.

**Phlibostroma quadrimaculatum** (Thomas)

San Juan Teotihuacan, Distrito Federal, 7500 feet, IX, 5, 1926, (H. B. Baker; high plains much like Colorado, arborescent yucca and *Opuntia* present), 1 ♂, [Univ. of Penna.].

This species was previously not known south of northern Chihuahua.

**Melanotettix dibelonus** Bruner

Acapulco, Guerrero, (A. Agassiz), 14 ♂, 6 ♀, 1 juv. ♀, [Mus. Comp. Zool. and Hebard Cln.].

**Sisantum notochloris** Bruner

Isthmus of Tehuantepec, 1 ♂, 1 ♀, [Mex. Govt.].

**Orphula azteca** (Saussure)

Paratypes of *Oxycoryphus zapotecus* Saussure 1861, taken in Mexico by Sumichrast, in the author's collection, show that name to be a synonym. The same is true of *Orphulella neglecta* Rehn 1900, as shown by the male type from Orizaba, Vera Cruz, in the Academy collection. The type and allotype of *Orphula guatemalae* Bruner, described from Santa Lucia, Guatemala, are in the author's collection and prove that name to be also a synonym. Such is likewise shown by the type, a large female, of *Orphula meridionalis* Bruner 1904 from Pozo Azul de Pirris, Costa Rica, in the same collection.

In 1906 Rehn recorded material from the State of Vera Cruz as follows: both sexes from Orizaba, Jalapa, Presidio and Coatepec as the synonymous *neglecta;* females (but not males) from Jalapa and Coatepec as *mexicana* (a synonym of *Orphulella punctata*) and a pair from Orizaba as *tepaneca.*

Cordoba, Vera Cruz, 850 meters, IX, 7, 1926, (H. B. Baker; in weeds and brush on limestone hillside, Las Tortolas), 2 ♂, [Univ.

of Penna. and A. N. S. P.]. Coscomatepec, Vera Cruz, 1580 meters, XI, 30, 1924, (pasture), 1 ♂, [Hebard Cln.]. Coatepec, Vera Cruz, 9 ♂, 4 ♀, [Mex. Govt. and Hebard Cln.]. Tapachula, Chiapas, (D. L. Crawford), 1 ♀, [Hebard Cln.]. Escuintla, Chiapas, (D. L. Crawford), 1 ♂, [Hebard Cln.].

Individuals are often wholly brown, but a color phase is frequently found in which the dorsum is green.

**Orphulella speciosa** (Scudder)

El Mante, Tamaulipas, 80 meters, VI, 2, 1931, (A. Dampf), 3 ♂, 1 ♀, [Mex. Govt. and Hebard Cln.].

This is the first Mexican record for this species which is very common in the central and eastern United States. Females of the species from Alta Mira, Tamaulipas, were however recorded as *tepaneca* by Rehn in 1904.

**Orphulella halophila** Rehn and Hebard

Tampico, Tamaulipas, XII, 1906, 1 ♂, 4 ♀, [A. N. S. P. and Hebard Cln.].

The above record is a southward extension of the known range of this species, which is confined to the low vegetation of salt marshes.

**Orphulella pelidna** (Burmeister)

Tampico, Tamaulipas, XII, 1906, 2 ♀, [Hebard Cln.].

**Orphulella aculeata** Rehn

Cuernavaca, Morelos, VIII, 1911, 1 ♀ (green), [Mex. Govt.].

**Orphulella tolteca** (Saussure)

Study of the original description and comparison with topotypes in the author's collection of *orizabae* McNeill from Mexico City and Tlalpam convinces us that that name is a synonym.

Material of this species was recorded by Rehn in 1900 and 1906 from Eslava, Distrito Federal, as *viridescens*. From the description that name is seen to be very probably a synonym either of *tolteca* or *punctata*.

Guadalajara, Jalisco, (D. L. Crawford), 3 ♂, 1 ♀, [A. N. S. P.]. Pedregal near Mexico City, XII, 2, 1923, (on dry lawn), 1 ♀, [Hebard Cln.]. Distrito Federal, VII, 1910, 1 ♂, 1 ♀, [Mex. Govt.].

**Orphulella punctata** (DeGeer)

This very common and extremely variable species of the American tropics has, as would be expected, a host of synonyms. With these we placed *Oxycoryphus mexicanus* Saussure in 1923. We now find Rehn's Mexican records of *zapoteca* to have been based on material of *punctata*, but that name to be a synonym of *Orphula azteca.*

A series of two hundred and fifty-one males and two hundred and fifty females is before us from the following localities.

TAMAULIPAS: Tampico.

VERA CRUZ: Coscomatepec, La Antigua, Jalapa, Vera Cruz, Medellin, Soledad, Atoyac, Cordoba, Orizaba, San Rafael, Presidio, San Francisco, San Lucrecia, Coatepec, Coatzacolcos.

PUEBLA: Necaxa.

MEXICO: Toluca.

MORELOS· Jojutla.

GUERRERO: Tierra Colorada, Rio Papagaio, Rincon, Acaguizotla at 3500 feet, La Venta.

OAXACA: Almoloyas, Ocotlan.

CHIAPAS: Tapachula, Escuintla.

YUCATAN: Temax, Chichen-Itza, Valladolid.

**Dichromorpha viridis** (Scudder)

Monterrey, Nuevo Leon, VII, 5, 1908, 1 ♀ (green), [Hebard Cln.]. Tampico, Tamaulipas, XII, 1906, 1 ♀ (green), [Hebard Cln.]. San Rafael, Vera Cruz, (C. H. T. Townsend), 1 ♂ (brown), [Hebard Cln.].

**Dichromorpha robusta** (Bruner)

Comparison of the literature with a male cotype of *Orphulella robusta* from Amula, Guerrero and the type of *Dichromorpha mexicana* Bruner from Tepic, Nayarit, both in the author's collection, and a series additional to those here recorded show that the latter name is a synonym.

The male from Tepic, Nayarit, described by Bruner as *Dichromorpha longipennis* (whence came the female type and paratypes of *longipennis* and male and female paratypes of his *Dichromorpha mexicana*) is properly referred to the present species.

Guadalajara, Jalisco, (D. L. Crawford), 19 ♂, 7 ♀ (one male brown dorsad, others there green; two females all brown, others all green: one male organs of flight decidedly caudate, all others showing very slight to marked reduction), [A. N. S. P.]. Ocotlan, Jalisco, VIII, 29 to IX, 1, 1906, (P. P. Calvert), 1 ♀ (brown), [A. N. S. P.].

This insect is normally easily distinguished from *prominula* by the decidedly more robust form, particularly in the female sex. The males in the present series are, in some cases, distinctly more slender than in others. We are satisfied, however, that *prominula* is a distinct species.

**Dichromorpha prominula** (Bruner)

A cotypic male and another taken with it at the Presidio, Mazatlan, Sinaloa, when compared with large series we have recorded as *Dichromorpha longipennis* Bruner from that State and the female type from Tepic, Nayarit, (paratypic females and two immature females of the original series are also in the author's collection) show beyond question the synonymy of the latter name. Bruner's male so described, however, is as surely referable to *robusta.*

The species varies greatly in size. A brown phase is the usual, but green individuals or those with green sides and brown dorsum also occur.

El Dorado, Sinaloa, XII, 23, 1928, (A. Dampf; in grass in sugar cane), 24 ♂, 11 ♀, 3 juv. ♀, [Mex. Govt. and Hebard Cln.], Guadalajara, Jalisco, VIII, 2 and IX, 14, 1903, (J. F. McClendon), 1 ♂ (brown), 1 ♀ (green), [A. N. S. P.]. Autla, Jalisco, 1 ♂, [Mex. Govt.].

**Morseiella flaviventris** (Bruner)

Compostela, Nayarit, XI, 5, 1929, (in corn), 4 ♀, [Mex. Govt. and Hebard Cln.]. Guadalajara, Jalisco, (D. L. Crawford), 2 ♂, [A. N. S. P.].

One female is melanistic, the first we have seen of this species. It is solidly blackish except the caudal femora proximad which, except in dorsal portion, are cinnamon rufous (the external ridges there black) and the distal half of the caudal tibiae which are deep jasper red.

**Morseiella diabolica** (Bruner)

Guadalajara, Jalisco, (D. L. Crawford), 1 ♂, [A. N. S. P.]. San Juan Teotihuacan, Distrito Federal, 7500 feet, IX, 5, 1926, (H. B. Baker; high plains with *Opuntia* and yucca), 2 ♂ (very small), [A. N. S. P. and Hebard Cln.].

This species was previously known only from the female type from Nayarit, in the author's collection. The male sex is very much smaller and shows much less tegminal reduction. It agrees with this sex of *flaviventris* closely, differing in the shorter antennae, more distinct definition of disk and lateral lobes of pronotum in prozonal portion, truncate caudal margin of pronotal disk and shorter caudal femora. From melanistic examples of that insect it is quickly separated by the pale (dark olive buff) face and deep brazil red ventro-proximal portions of the caudal femora, elsewhere being blackish brown, the caudal tibiae showing only a reddish tinge distad.

The Guadalajara male measures: length of body 17.3, length of pronotum 4.6, greatest width of pronotal disk 2.7, length of tegmen 9.4, length of caudal femur 13.2 mm.

**Morseiella rufipes** new species (Pl. XVII, fig. 8)

This species, distinctively colored, differs from all other previously known forms particularly in having the caudal tibiae pink except in extensor surfaces and paling very slightly proximad and the caudal femora not barred (being barred in all but melanistic examples of the other species).

The distinctive foveolae and weak but evident definition between pronotal disk and lateral lobes agree with *diabolica*. The former are slightly less pronounced than in that species and there is weak but distinct widening of the pronotal disk caudad in the male (not shown by males of that species) while its caudal margin is very faintly obtuse-angulate emarginate instead of transverse.

*Type.*—♂; Morelos, Mexico. (D. L. Crawford.) [Hebard Collection, Type No. 1190.]

Size and form medium for the genus. Head not large. Fastigium much as in *diabolica*, slightly more produced than in *dampfi* here described, moderately impressed with lateral margins distinct, elongate impressed foveolae present. Fastigio-facial angle rounded much as in *flaviventris*. Pronotum as in that species, slightly wider caudad than cephalad, with a distinct medio-longitudinal carina, the lateral carinae appreciable cephalad and caudad; caudal margin showing very faint obtuse-angulate emargination; lateral lobes with caudal margin very weakly concave. Tegmina longer but otherwise as described here for *dampfi;* caudal femora and genitalia as in that species.

Occiput and dorsum of pronotum chestnut brown, the latter darker caudad; lateral margins of latter and tegmina slightly paler, the tegmina shining black ventro-proximad, this continued as a broad bar across and occupying the dorsal portion of the pronotal lateral lobes and widening cephalad but back of the eyes narrower on the head. Abdomen cinnamon brown paling to buckthorn brown ventrad. Antennae brown proximad, thence black. Face, genae, ventral portion of pronotal lateral lobes and pleura brownish buff. Cephalic and median limbs buckthorn brown darkening distad. Caudal femora brownish buff dorsad and narrowly before genicular areas, dresden brown laterad gradually changing to nopal red ventrad; genicular areas black. Caudal tibiae as described above; generally nopal red but black at bases.

Length of body 18.8, length of pronotum 4, caudal width of pronotal disk 2.8, length of tegmen 8, width of tegmen 3.9, length of caudal femur 13.1 mm.

**Morseiella dampfi**[14] new species (Pl. XVII, fig. 9)

This handsome insect is distinguished from *flaviventris* (Bruner) by the proportionately larger head, slightly heavier caudal femora, decidedly more reduced male tegmina and distinctive color pattern and coloration.

It is largely black and light yellow, a dorsal post-ocular band of the latter extending to the tegminal apices, the proximal half of the costal fields of the tegmina shining black, the caudal tibiae black with a broad pale yellow annulus just beyond the base.

*Type.*—♂; San Geronimo, Oaxaca, Mexico. July, 1927. [Hebard Collection, Type No. 1182.]

Size large; form robust, more so than in *flaviventris.* Head large; fastigium moderately impressed, about as long as broad with lateral margins distinct; areas of lateral foveolae distinct, with a few impressed punctae. Fastigio-facial angle very slightly more broadly rounded than in *flaviventris.* Pronotum distinctly wider caudad than cephalad,[15] with a distinct medio-longitudinal carina, cut caudad by the principal sulcus (the prozona about one and two-thirds times as long as the metazona); caudal margin transverse, showing a mere trace of convexity; lateral lobes with caudal margin distinctly sinuate, more so than in *flaviventris*. Tegmina much reduced, covering only proximal three-fifths of abdomen, overlapping with broad apices truncate but appreciably convex; marginal field narrowing moderately distad but humeral and discoidal veins diverging there.[16] The caudal femora considerably surpass the abdominal apex with rasps on ventro-internal carina decided as in *flaviventris*. Genitalia simple, as in that species.

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[14] Named in honor of Dr. Alfonso Dampf of the Mexican Department of Research, who has rendered us valuable assistance in studying Mexican Orthoptera.

[15] Slightly wider caudad than cephalad in *flaviventris.* This incorrectly stated by Bruner in the original description.

*Allotype.*— ♀ ; same data as type. [Hebard Collection.]

Very much larger and more robust than male. Head even larger in proportion to body bulk. Fastigium with impression slightly broader than long. Tegmina more reduced, represented by broad ovate attingent pads, shorter than pronotum (in the series sometimes showing slight distal truncation). Ovipositor jaws very short.

Occiput and dorsum of pronotum black, separated from shining black postocular areas and dorsal portions of pronotal lateral lobes by a heavy line of amber yellow (continued on the humeral trunk of the tegmina). Face and genae mustard yellow often (particularly the former) tinged with brown. Antennae proximad similarly colored, quickly becoming very dark brown. Ventral portions of pronotal lateral lobes amber yellow, invaded in cephalic portion by a thick rounded arm of the shining black dorsal area directed ventro-cephalad. Tegmina dorsad dresden brown, in males shading distad to old gold, humeral trunk and distal portion of marginal field (weakly) amber yellow, proximal portion of the latter and adjacent portion of thorax shining black. Cephalic and median limbs colored much like face. Caudal femora mustard yellow, tinged with brown dorsad in all but distal portion, with two complete brown bands and apical portion black. Caudal tibiae and tarsi black, the former with a broad annulus of yellow near base. Dorsum of abdomen old gold in males, darker in females. Whole ventral surface amber yellow.

Little size variation is shown, the measurements of the allotype being here followed by those of the largest of twelve paratypic females. Length of body ♂ 23.8, ♀ 33.2 (abdomen retracted) and 35.8 (abdomen extruded); length of pronotum ♂ 6.3, ♀ 8 and 7.7; greatest caudal width of pronotal disk ♂ 4.3, ♀ 6.2 and 6.6; length of tegmen ♂ 7.3, ♀ 7.2 and 8; width of tegmen ♂ 4, ♀ 4.8 and 5.8; length of caudal femur ♂ 16.7, ♀ 21.8 and 22 mm.

*Specimens Examined.*—16; 3 males and 13 females.

VERA CRUZ: Vera Cruz, (D. L. Crawford), 1 ♂ (small), [Hebard Cln.].

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[16] The general type is definitely the same as that of *flaviventris*, the characters obscured by the greater reduction which has occurred.

Oaxaca: Almoloyas, XI, 1922, (J. J. White), 1 ♂, *paratype*, [Hebard Cln.]. San Jeronimo, VII, 1927, 1 ♂, 13 ♀, *type*, *allotype*, *paratypes*, [Hebard Cln. and Mex. Govt.].

**Scyllina viatoria viatoria** (Saussure)

Autla, Jalisco, 2 ♀, [Mex. Govt.]. Guadalajara, Jalisco, XI, 1927, 5 ♀, [Mex. Govt.]; (D. L. Crawford), 2 ♂, 8 ♀, [A. N. S. P.]. Cuernavaca, Morelos, VIII, 1911 and XII, 1910, 1 ♂, 3 ♀, [Mex. Govt.]. Jojutla, Morelos, VI, 1929, (J. J. White), 2 ♀, [Hebard Cln.]. Villa Union y Concordia, Sinaloa, 1 ♂, [Mex. Govt.]. Ocotlan, Oaxaca, III, 6, 1922, (J. J. White), 2 ♂, 1 ♀, [Hebard Cln.].

In 1923 we revised this species, placing *nobilis* (Walker), *patriae* (Scudder), *calida* (Bruner) and *macneilli* (Bruner) as synonyms and reducing *excelsa* (Bruner) to racial status.

**Scyllina viatoria excelsa** (Bruner)

Distrito Federal, 2 ♀, (one typical, one pale), [Mex. Govt.].

**Zapata brevipennis** Bruner

This species was based on a female from Lerdo, Durango, now in the author's collection. In 1927 Rehn described as *bucculenta* a female from Durango, Durango, belonging to the United States National Museum. A female now before us from the Chinati Mountains, Texas, in the Big Bend just across the Coahuila line, agrees best with the latter specimen but has the eyes as large as the former. We believe that *bucculenta* possibly represents a race of *brevipennis* but more probably is a synonym. Additional material alone can decide this.

**Scyllinops salina** (Bruner)

In 1927 Rehn erected the genus *Scyllinops*, transferring the present species to it and placing *Stirapleura meridionalis* Bruner as a synonym. The specimens upon which these names were based were taken by C. C. Deam and labelled Salina Cruz, Mexico.

Gamboa, Oaxaca, (D. L. Crawford), 1 ♀, [Hebard Cln.].

**Psoloessa texana pusilla** (Scudder)

Between Alamos and Navajoa, Sonora, 300 meters, III, 28, 1927, 4 ♂, [Mex. Govt. and Hebard Cln.]. Guadalajara, Jalisco, (D. L. Crawford), 7 ♂, 11 ♀, [Acad. Nat. Sci. Phila.].

Zapotlan, Jalisco, VII, 7, 1902, (C. H. T. Townsend), 1 ♂, 1 ♀, [Acad. Nat. Sci. Phila.]. San Luis Potosi, San Luis Potosi, VIII, 5, 1903, (M. E. Hoag), 1 ♀, [A. N. S. P.].

This material is atypical, the series being quite constant, averaging smaller and less robust than New Mexican material, with fastigium narrow. The fastigium in the San Luis Potosi female is distinctly narrower than in the others, in this feature alone suggesting divergence toward the semi-brachypterous *brachyptera* Bruner, described from Oaxaca.

**Aulocara elliotti** (Thomas)

Cuernavaca, Morelos, 1 ♀, [Mex. Govt.].

### OEDIPODINAE

**Arphia nietana** Saussure

Comparison of the unique female type of Bruner's *imperfecta* from Tlalpam, Distrito Federal, shows that name to be a synonym, based on a small individual with less suffusion of the apices of the wings than often occurs. This latter feature is apparently more frequently shown in females than in males.

Coatepec, Vera Cruz, 1 ♀ (caudal tibiae light glaucous in median half), [Hebard Cln.]. Distrito Federal, 2 ♂, 2 ♀, [Mex. Govt.]. Texcoco, Mexico, X, 1919, 1 ♀ (caudal tibiae in median half brownish), [Mex. Govt.].

In material from the Distrito Federal the caudal tibiae are sometimes brownish, sometimes very dull glaucous.

In males before us two have the dorsal fields of the tegmina buff in distal three quarters; this weakly indicated in another and absent in four others.

The wing disk is usually bittersweet orange, but in a single male from Eslava, Distrito Federal, it is grenadine pink.

**Arphia pseudonietana** (Thomas)

Syn. *Arphia calida* Bruner.

Two males and a female from Zacatecas in the author's collection were described as *calida* by Bruner. These specimens can not be considered even racially distinct from *pseudonietana*, but agree best with Durango material so recorded by Bruner in having the wing band averaging narrower and less extensive than in series from the United States. In the present species that feature is too variable to be used even as a racial character and the higher pronotal crest described by Bruner is clearly another feature of individual variation as such is shown only by the one female of the specimens from Zacatecas. We consequently here synonymize *calida.*

Colonia Garcia, Chihuahua, (C. H. T. Townsend), 26 ♂, 3 ♀, [Hebard Cln.].

It is interesting to note that none of the present Mexican specimens shows any approach toward the large, more robust and more richly colored but very closely related insect of the southwestern United States which Bruner has described as *crassa* and which will certainly be found in Mexico along the northern boundary.

**Arphia** sp.

A female from Jalisco, recorded by Bruner as *ovaticeps* Saussure, is in the author's collection. That name was this year assigned to synonymy under *pseudonietana.* The present species, though evidently closely related, has the caudal tibiae dull glaucous to the proximal annulus, a condition not found in any of the huge series of *pseudonietana* we have examined.

**Arphia pallidipennis** Bruner

We believe that the originally described male (as well as a female of *nietana* so labelled) did not come from Coatzacolcos, Vera Cruz, but from the highlands, probably near Eslava, Distrito Federal, whence came the type female. These specimens are in the author's collection.

Very closely related but decidedly more robust is *townsendi* Bruner, as is shown by the original series in the author's collection from Colonia Garcia, Chihuahua.[17] Quite probably no more than a geographic race is represented.

**Arphia simplex** Scudder

Valles, San Luis Potosi, I, 26, 1909, 1 ♂, [Illinois State]. Cordoba, Vera Cruz, XII, 9, 1925, 1 ♀, [Hebard Cln.]. This insect is widely distributed through northeastern Mexico. In 1925 we placed *decepta* Bruner as a synonym.

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[17] The male originally recorded from the San Francisco Mountains, Arizona, from the series described as *townsendi,* represents not this insect but the phase or race of *conspersa* Scudder which occurs on the Arizona Plateau.

**Chortophaga viridifasciata** (DeGeer)

Monterrey, Tamaulipas, VII, 5, 1908, 1 ♀ (green), [Illinois State]. Vera Cruz, Vera Cruz, (D. L. Crawford), 1 ♂ (green); XII, 1, 1927, (Mowelnitt), 1 ♀ (green), [both Hebard Cln.].

**Chimarocephala pacifica incisa** Caudell

This year[18] we stated that *incisa* was a southern race of the species. In Mexico it probably occurs only in Baja California.

Saussure's *behrensi* was placed as a synonym of the northern, Californian race, *pacifica pacifica*, by Caudell in 1906.

**Encoptolophus subgracilis** Caudell

Widely distributed over northern Mexico south to Jalisco, this common species has frequently been reported as *costalis*.

Canales, Tamaulipas, VII, 6, 1908, 2 ♂, [Illinois State]. Rodriguez, Nuevo Leon, VI, 5 to 7, 1931, (A. Dampf; at light), 23 ♂, 35 ♀ (two females green), [Mex. Govt. and Hebard Cln.]. Monterrey, Nuevo Leon, VII, 4 and 5, 1908, (at light), 5 ♂, 2 ♀, [Illinois State]. Tampico, Vera Cruz, XII, 26, 1908, 1 ♂, [Illinois State]. Ochoa, near Tampico, Vera Cruz, VII, 6, 1908, 2 ♀, [Illinois State]. Valles, San Luis Potosi, I, 18, 1909, (in corn field), 1 ♂, [Illinois State]. Guanajuato, Guanajuato, 1 ♀, [Mex. Govt.].

Mexican individuals of this common adobe-loving species are, as a rule, considerably larger and more richly colored than those from the western United States. The Rodriguez series averages very large, that from Monterrey shows great size variation.

**Encoptolophus otomitus** (Saussure)

Described from "more eastern Mexico" this species was more fully discussed by Saussure in 1884. The original assignment to *Chimarocephala* evidently led Bruner to describe *Encoptolophus herbaceus*, the original series showing that name to be a synonym.

The species is clearly nearest *fuliginosus* Bruner and widely distinct from *Chimarocephala*. In markings, however, *Encoptolophus costalis* is suggested.

Chapultepec, Mexico City, Distrito Federal, V, 4, 1924, (on dry lawn), 1 ♀, [Hebard Cln.]. Ocotlan, Oaxaca, III, 1 to 21, 1922, (J. J. White), 8 ♂, 20 ♀, 1 juv. ♀ (ten females and immature female green, one female greenish, others brown), [Hebard Cln.].

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[18] Trans. Amer. Ent. Soc., LVII, p. 119.

**Encoptolophus fuliginosus** Bruner

The original series from Colonia Garcia, Chihuahua, and a pair from Guadalajara, Jalisco, recorded by Rehn in 1904 as *parvus* (a synonym of *costalis*) are all that is known of this insect.

It is very close to *costalis*, quite possibly a geographic race. The vertex averages narrower, the pronotal disk more elongate, while the sides of the pronotum are much more extensively shining blackish except in a very few individuals of the green color phase.

Compared with *otomitus* it is found to have the vertex broader and less produced and it is a much larger insect.

Though *Encoptolophus costalis* (Scudder) has not yet been taken in Mexico, it should be found along the northern border from Tampico to Sonora.

**Hippopedon saltator** Saussure

Iguala, Guerrero, 1929, (H. Kruger), 1 ♂, [A. N. S. P.].

This Trachyrhacoid insect is quickly recognized by the weak geranium pink suffusion of the wings toward the body.

**Hippiscus ocelote** Saussure

Vera Cruz, Vera Cruz, (D. L. Crawford), 1 ♂, [Hebard Cln.]. Guadalajara, Jalisco, (D. L. Crawford), 2 ♂, [A. N. S. P.].

We have examined the type of *ocelote*, a male from Cordoba, Vera Cruz, in the Geneva Museum.

**Xanthippus corallipes pantherinus** (Scudder)

Moctezuma, Chihuahua, V, 1893, (C. H. T. Townsend), 1 ♂ (caudal femora internally deep pink), [Hebard Cln.]. Chihuahua City, Chihuahua, 4700 feet, VIII, 16 to 18, 1906, (P. P. Calvert), 1 ♂ (caudal femora internally blue black), [A. N. S. P.].

The Moctezuma specimen was recorded by Bruner as *Hippiscus conspicuus* in 1905. That name we placed as a probable synonym of *corallipes pantherinus* in 1929.

**Xanthippus corallipes pardalinus** (Saussure)

Guadalajara, Jalisco, VIII, 17, 1903, (J. C. McLendon), 1 ♀, [A. N. S. P.].

This specimen was recorded by Rehn as *Hippiscus zapotecus* in 1904. We believe that it represents the race of the lower highlands in central Mexico.

It is very close but apparently separable from *pantherinus*. Should they, however, prove to be inseparable, the name *pantherinus* would fall. More material is needed to determine the number of recognizable races of the species present in Mexico.

We have examined the types, and a female later recorded by Saussure, from Orizaba, Vera Cruz and Puebla, and find them to differ from *corallipes zapotecus* in being considerably larger with pronotum more produced caudad and its medio-longitudinal carina more conspicuous and convex on the metanotum.

The present specimen is larger but the pronotal features are not indicated and are, we believe, attributable to individual variation. This specimen measures: length of body 43, length of pronotum 10.3, length of tegmen 39.5, length of caudal femur 20.8 mm.

**Xanthippus corallipes zapotecus** (Saussure)

We have examined the types of *zapotecus* and *toltecus* in the Geneva Museum, in each case a female, and find the latter name a synonym.

Distrito Federal, 1 ♂, 1 ♀, [Mex. Govt. and Hebard Cln.]. Tlalpam, Distrito Federal, XI, 1887, (L. Bruner), 2 juv. recorded as *pardalinus* by Bruner in 1905, [Hebard Cln.].

We question the locality of a female in the author's collection labelled "Vera Cruz," recorded as *pardalinus* by Scudder in 1892 and by Bruner in 1905.

The present pair measure: length of body ♂ 27.8, ♀ 39; length of pronotum ♂ 7.3, ♀ 9.7; length of tegmen ♂ 29.3, ♀ 33.8; length of caudal femur ♂ 17, ♀ 18.8 mm. Additional material may show these to be atypical toward *corallipes pardalinus*. If so, *corallipes zapotecus* should be found typical at still higher elevations in this region.

**Leprus elephas** Saussure

Though only a male and three females from San Luis Potosi are in the Academy collection, they show not only the differences in size but also in degree of production of the pronotum caudad given by Saussure when describing *corpulentus*. We therefore agree with Scudder in considering that name a synonym.

The material which Bruner in 1905 reported as *corpulentus* from New Mexico and Arizona, however, represents a different species, having the wing disk blue-green instead of light yellow.

**Leprus glaucipennis** Bruner

Ensenada, Baja California, VII, 2 to 5, 1905, (F. X. Williams), 3 ♀, [Hebard Cln.]. El Paraiso, Baja California, V, 1889, (T. S. Brandegee), 1 ♀ (unusually large; length of body 43.3, length of tegmen 40.7 mm.), [Hebard Cln.]. San Esteban, Baja California, IV, 1889, (C. D. Haines), 1 ♀, [Mex. Govt.].

Though reported by Scudder in 1900 from Durango and San Luis Potosi, we are convinced that those determinations are incorrect. The species is probably common in Baja California and the male recorded from Hermosillo, Sonora, by Bruner in 1905 is in the author's collection.

**Tropidolophus formosus** Say

Jiminez, Chihuahua, (Rocha), 1 ♀, [Hebard Cln.].

**Dissosteira venusta** (Stål)

Ensenada, Baja California, VII, 2 to 5, 1905, (F. X. Williams), 1 ♂, 3 ♀, [Hebard Cln ].

**Spharagemon collare cristatum** Scudder

Monterrey, Nuevo Leon, VII, 4 and 5, 1908, 2 ♀, [Hebard Cln.]. Valles, San Luis Potosi, I, 6, 1907, 1 ♂, [Hebard Cln.].

### Group *Lactistae*

The generic assignment of the species referred to *Lactista* and *Tomonotus* has for some time been known by us to be unnatural. The material now available for study enables us to consider in detail the eleven known valid species, this showing that two additional generic units must be recognized. The genera involved may be separated by the following characters.

A. Fastigium little produced. Antennae filiform. Pronotum with medio-longitudinal carina very weakly if at all cristate. Caudal femora without conspicuously flattened ventro-external surface.

  B. Fastigial impression longer than broad. Fastigium rounding into frontal costa with very weak angulation. Pronotum with cephalic margin of disk slightly produced. Wing band leaving a large apical area so that the brightly colored disk is about as wide as deep, taenia short.

C. Form slender. Pronotal cristation low but definite. Fastigial impression decidedly longer than broad (slightly longer than broad in females of the Central and northern South American *pulchripennis* Saussure only). Margins of caudal femora not lamellate.......*Lactista* Saussure

CC. Form robust. Pronotum with a medio-longitudinal carina; cristation, if suggested, in prozonal portion only. Fastigial impression slightly longer than broad. Margins of caudal femora weakly lamellate..*Platylactista* new genus

BB. (Form decidedly robust.) Fastigial impression broader than long. Fastigium rounding into frontal costa without angulation. Pronotum with cephalic margin of disk transverse. Wing band leaving a small apical area so that the brightly colored disk is much wider than deep, taenia very conspicuous and elongate. (Ventral margin of caudal femora more conspicuously lamellate, particularly mesodistad.) (Pronotal crest low to very low.) *Leuronotina* new genus

AA. Fastigium well produced (rounding into frontal costa with considerable angulation). Antennae flattened and conspicuously widened proximad. Pronotum medio-longitudinally strongly cristate, (cephalic margin of disk decidedly angulate produced). Caudal femora with a conspicuous flattened ventro-external surface below external pagina. (Wings as given for *Leuronotina*. Form robust.)....*Tomonotus* Saussure

So distinct is *Tomonotus* that it may well be considered the single member of a distinct group, the Tomonotae.

## LACTISTA Saussure

Rehn in 1904 selected *Oedipoda punctata* Stål as genotype of *Lactista*, Kirby's selection of another species as genotype in 1910 being thereby invalidated.

In the species of this genus the wing disk is flame scarlet to orange yellow (*punctatus*), light orange (*pellepidus*), light yellow with an orange tinge (*gibbosus* and *oslari*), very light greenish yellow (*punctipennis*) and light greenish yellow to light blue (*humilis*).

**Lactista pellepidus** Saussure

Chichen Itza, Yucatan, (E. Thompson), 16 ♂, 6 ♀, [Field Mus.].

In this insect the wing disk appears to be buff yellow to apricot yellow, varying very little in shade.

**Lactista punctatus** (Stål)

Tampico, Tamaulipas, XII, 1906, 2 ♂, 2 ♀, [Illinois State]. Tamos, Vera Cruz, XII, 7, 1909, (F. C. Bishopp), 1 ♀, [U. S. N. M.]. Pueblo Viejo, Vera Cruz, XII, 8, 1909, (F. C. Bishopp), 2 ♂, 1 ♀, [U. S. N. M.]. Medellin, Vera Cruz, X, 1895, (T. Heyde), 1 ♂, 1 ♀, [Hebard Cln.]. Soledad, Vera Cruz, 1 ♂, [Hebard Cln.]. Jalapa, Vera Cruz, VI, 1894, 2 ♂, 3 ♀, [Hebard Cln.]. San Rafael, Vera Cruz, (C. H. T. Townsend), 6 ♂, 5 ♀, [Hebard Cln.]. Potrero, Vera Cruz, X, 28, 1924, 2 ♂, [Mex. Govt.]. Coatepec, Vera Cruz, 1 ♂, 1 ♀, [Mex. Govt.]. Valles, San Luis Potosi, I, 26, 1909, 1 juv. ♀, [Ill. State Lab.]. La Barca, Jalisco, 2 ♂, 1 ♀ (paler than usual, wing disk orange chrome, caudal tibiae between annuli tinged with greenish yellow in males, clear cadet blue in female), [Mex. Govt.]. Guadalajara, Jalisco, (D. L. Crawford), 49 ♂, 46 ♀ (pale to dark, wing disk orange buff to mikado orange, caudal tibiae between annuli buff variously tinged with brown), [A. N. S. P.]. Ocotlan, Jalisco, 5000 feet, VIII, 29 to IX, 1, 1906, (P. P. Calvert), 1 ♂ (dark, wing disk mikado orange, caudal tibiae between annuli buff), [A. N. S. P.]. Yurecuaro, Michoacan, 5000 feet, IX, 4, 1906, (P. P. Calvert), 1 ♂ (dark, wing disk orange chrome, caudal tibiae between annuli buff), [A. N. S. P.]. Almoloyas, Oaxaca, XI, 1922, (J. J. White), 2 ♀ (dark, wing disk deep chrome, caudal tibiae between annuli brownish buff), [Hebard Cln.].

All of our specimens from Vera Cruz are dark, with wing disk flame scarlet and caudal tibiae between the annuli dull blue to cadet blue.

In 1902 Rehn recorded this species as *Tomonotus mexicanus* from Uruapan and Patzcuaro, Michoacan, but a female then so recorded from Cuernavaca, Morelos, represents *Lactista humilis* here described. In 1905 Rehn so recorded series from Cuernavaca, Zapotlanejo and Zapotlan, all in Jalisco.

This is a variable insect and more closely related than we had supposed, on the one hand to *pellepidus* Saussure from Yucatan (with flat pronotal crest and weakly orange wing disk) and on the other to *oslari* Caudell from Arizona and Sinaloa (with pinard yellow wing disk). Those names may represent only races, but material from many additional places in the intervening regions is needed to decide this.

**Lactista oslari** Caudell

Hermosillo, Sonora, IV, 1897, (A. Koebele), 3 ♂, [U. S. N. M. and Hebard Cln.]. Los Mochis, Sinaloa, V, 17, 1930, 2 ♀, [Mex. Govt.]. Tepic, Nayarit, 3 ♀, [Hebard Cln.].

Rehn's record from Mazatlan, Sonora of *Lactista gibbosus* in 1902 we correctly referred to *oslari* in 1925 but did not note that in 1904 he had reassigned the specimen to *Tomonotus mexicanus.*

**Lactista gibbosus** Saussure

Comondu, Baja California, III, 1889, (C. D. Haines), 1 ♀, [Hebard Cln.]. San José del Cabo, Baja California, 1 ♀, [U. S. N. M.].

This species in Mexico is confined to Baja California. In 1925 we pointed out that the records from Mazatlan, Sinaloa, were based on material of *oslari.*

**Lactista humilis** new species (Pl. XVII, fig. 10)

This diminutive species is distinguished by the narrow fastigium, frontal costa usually deplanate without lateral carinae dorsad of the median ocellus,[19] low pronotal crest, wing band averaging less intense and less extensive than in the other species and wing disk pale blue-green (rarely pale blue).

It is known only from Puebla, Morelos and Guerrero, and a pair from Cuernavaca was recorded by Rehn, the male as *Tomonotus aztecus* in 1900, the female as *Tomonotus mexicanus* in 1902.

*Type.*—♂; Cuernavaca, Morelos, Mexico. January 4, 1899. [Hebard Collection, Type No. 1192.]

Size small for the genus, form normal. Occiput and disk of pronotum rough, with some tubercles present in metazonal portion of the latter. Fastigium narrow, its lateral carinae not meeting cephalad but disappearing at juncture with frontal costa, just beyond which point is a small impression; lateral foveolae small and distinct; fastigium rounding into frontal costa with a very faint trace of angulation. Frontal costa very slightly widest at median ocellus, sulcate thence ventrad. Pronotum with percurrent median carina which is weakly cristate becoming very weak caudad on metazona, a weak elevation with irregular projections on mesozonal portion suggesting a feeble development of the condition found in *Xanthippus;* production of caudal margin of disk subrectangulate with immediate apex rounded; lateral lobes with latero-caudal angles evenly rounded. Tegmina and wings fully developed but not as very strongly caudate as is usual in the preceding species. Caudal femora rather short and broad for the genus.

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[19] In some specimens lateral carinae are there present as is usual in the other species.

*Allotype.*— ♀; Cuernavaca, Morelos, Mexico. [Hebard Collection.]

Larger and heavier than male. Vertex and frontal costa broader and smoother. Pronotal cristation even lower. Ovipositor valves short, with apices moderately curved.

General coloration grayish brown maculate with darker. Tegmina mottled individually to different degrees, with a single poorly defined transverse median band and apical portion obliquely somewhat paler and vitreous. Caudal femora with base, apex and two bands dark but not sharply defined and separated by buffy areas, these in some specimens almost obsolete. Wing band diffused, often showing a gap between the weak taenia and the band, the taenia sometimes almost obsolete, costal margin very dark in subapical third, apex of wing weakly to heavily suffused, disk individually light viridine green (yellow-green), pale blue-green or pale blue (Jojutla specimen only).[20]

The measurements of the smallest paratypic male precede those of the type. Length of body ♂ 13.8 and 15.1, ♀ 19.8; length of pronotum ♂ 3.4 and 3.8, ♀ 4.7; caudal width of pronotal disk ♂ 2.7 and 2.9, ♀ 3.7; length of tegmen ♂ 15.8 and 17.3, ♀ 20.3; length of caudal femur ♂ 9.2 and 9.9, ♀ 11; width of caudal femur ♂ 2.7 and 2.9, ♀ 3.3 mm.

*Specimens Examined.*—16; 11 males and 5 females.

Atlixco, Puebla, (F. D. Godman), 1 ♂, [Hebard Cln.]. Cuernavaca, Morelos, I, 4 and IX, (Barrett; Crawford), 3 ♂, 2 ♀, *type, allotype* and *paratypes*, [Hebard Cln. and A. N. S. P.]. Jojutla, Morelos, V, 1929, (J. J. White) 6 ♂, 3 ♀, *paratypes*, [Hebard Cln.]. Morelos, (Crawford; Koebele), 3 ♂, 1 ♀, [A. N. S. P., U. S. N. M. and Hebard Cln.]. Venta de Zopilote, Guerrero, 2800 feet, X, (H. H. Smith), 1 ♀, [Hebard Cln.]. Iguala, Guerrero, IX, 1898, (O. W. Barrett), 1 ♂,[20] [Hebard Cln.]. Cocula, Guerrero, XII, 1898, (O. W. Barrett), 3 ♂, [Hebard Cln.].

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[20] A distressing accident in relaxing the Guerrero specimens for spreading occurred. The relaxer was showing mould and much more than the few drops of carbolic acid necessary was mixed in the sand to kill that growth. The wing disk in these specimens, originally pale blue green, was changed to a bright rufous by the acid; that color appears to be fading out but the original coloration has been destroyed.

### PLATYLACTISTA new genus

We erect this genus to include as genotype, *Oedipoda azteca* Saussure, a species described from Lake Metztitlan, Hidalgo, in 1861, which in 1884 was referred by that author to *Tomonotus*, and *micrus* here described.

The genus is much more closely related to *Lactista* than to any other of its allies, as may be determined from the key on page 250, where its diagnostic characters are given.

The species of *Platylactista* have the wing disk yellow (*aztecus*), and very pale blue with a faint tinge of green (*micrus*).

**Platylactista aztecus** (Saussure)

Ochoa, Tamaulipas, VII, 6, 1908, 1 ♀, 1 juv. ♀, [Hebard Cln.]. Victoria, Tamaulipas, VII, (O. W. Barrett), 2 ♀; XII, 10, 1909, (F. C. Bishopp), 1 ♂, 1 ♀, [all Hebard Cln.]. Monterrey, Nuevo Leon, VII, 4 and 5, 1908, 3 ♂, 7 ♀, [Illinois State and Hebard Cln.]. Torreon, Coahuila, X, 30, 1909, (J. Friesser), 1 ♀, [Field Mus.]. Durango, Durango, (O. W. Barrett), 1 ♀, [Hebard Cln.]; XI, 27, 1909, (F. C. Bishopp), 1 ♀, [U. S. N. M.]. Aguascalientes, Aguascalientes, XII, 1, 1909, (F. C. Bishopp), 1 ♀, [U. S. N. M.]; XI, 1887, (L. Bruner), 1 ♂, 1 ♀, [Hebard Cln.]; (C. C. Deam), 1 ♀, [Hebard Cln.].

The Tamaulipas series, like large Texan series before us, have the wing disk dull and light sulphur yellow, whereas those from San Luis Potosi, Durango and Aguascalientes have that area light lemon chrome (a definitely brighter and more lemon color) as is also the case in large series from Arizona In the latter, however, the wings show a conspicuous hyaline gloss, not present in any of the Mexican specimens.

Described from "Mexico," later in 1884 given as Lake Metztitlan, Hidalgo, Saussure then further stated that that material had the wing disk citrine. At that time he also recorded Texan material and in that description the description of the wing disk as sulphurous applies only to the Texan series by inference (as our series strongly indicate).

Two races may well be indicated, but detailed study of our very large series from the United States (which we intend to undertake shortly) will best determine this. At present it is preferable to state only that our Tamaulipan and Texan series are not typical.

**Platylactista micrus new species** (Pl. XVIII, fig. 1)

This insect is closely related to *aztecus*, differing in its smaller size, more definite tuberculation of occiput and pronotal disk, wings with disk faint greenish blue and hyaline, wing band narrower with a strong external angulate emargination at apex of first (principal) radiate vein and caudal femora with dorsal margins very slightly more lamellate but showing a distinct sudden narrowing meso-distad.

The caudal femora have the ventral margin showing nearest approach to *Leuronotina orizabae* (Saussure), but the dorsal margin in that insect is not so specialized.

*Type.*— ♀ ; Ocotlan, Oaxaca, Mexico. March 20 and 21, 1922. (J. J. White.) [Hebard Collection, Type No. 1210.]

Size small, form slightly more robust and organs of flight proportionately shorter than in *aztecus*. Fastigium broad, impression slightly longer than broad, lateral carinae continued to those of frontal costa, a shallow depression between fastigium and frontal costa margined by carinulae; lateral foveolae conspicuous; fastigium rounding broadly into frontal costa with angulation feebly indicated. Frontal costa suddenly constricted just below median ocellus, much wider between antennae than elsewhere, lateral carinae distinct throughout. Occiput with a few prominent tubercles; pronotum with prozona showing some tubercles and a double pair of foveolae (such as occur in *Xanthippus*) prominent (weaker in *aztecus*), metazona prominently tuberculate (tuberculations fewer and weaker in *aztecus*). Pronotum with surface elevated to median carina in prozonal portion, the carina present in metazonal portion becoming decided briefly cephalad; production of caudal margin of disk subrectangulate; lateral lobes with convexity of ventro-caudal angles flattened (tooth obsolete or very weakly indicated). Tegmina and wings fully developed, but not strongly caudate. Caudal femora short and broad, margins weakly lamellate, particularly the dorsal margin specialized as noted above. Ovipositor valves short, with apices moderately curved.

*Allotype.*—♂; Mitla, Oaxaca, Mexico. June 27, 1900. (C. C. Deam.) [United States Nat. Mus.]

Specimen damaged. Much smaller and less robust than female. Vertex and frontal costa very similar, slightly narrower and carinae slightly more prominent. Pronotum with contour very similar, tuberculation slightly more closely placed.

General coloration dull reddish brown (grayish brown in Mitla pair), maculate with darker. Tegmina with two dark transverse bands and dark flecks beyond toward the sutural margin, the remaining distal portion vitreous with delicate tegminal venation alone brown. Caudal femora of the ground coloration, then slightly paler before a subapical dark brown band, followed by a paler area and genicular portion (except paler genicular lobes in paratypic female) reddish brown in all. Caudal tibiae buffy tinged with reddish brown distad and a broad and very faint annulus of the same meso-proximad. Wing disk light etain blue, vitreous; band moderately broad, almost breaking before the weak taenia and with a decided external angulate emargination at apex of first radiate vein; apices colorless but costal margin blackish brown from inner margin of band to near apex of wing.

The measurements of a paratypic female, bearing the same data as the allotype, in the United States National Museum, precede those of the type. Length of body ♂ 12.3, ♀ 17.2 and 17.4 (estimated, abdomen extruded); length of pronotum ♂ 3, ♀ 4 and 4; caudal width of pronotal disk ♂ 2.9, ♀ 3.7 and 3.7; length of tegmen ♂ 15.7, ♀ 18 and 18.7; length of caudal femur ♂ 9.1, ♀ 10.1 and 10.8; width of caudal femur ♂ 2.9, ♀ 3.3 and 3.4 mm.

## LEURONOTINA new genus

In 1861 Saussure described *Tomonotus*, including five species now known to be referable to five distinct genera. In 1904 Rehn selected *mexicanus* as genotype of *Tomonotus*. Bruner's *ferruginosus* is congeneric, but the other species which have for recent years been so assigned, *aztecus* and *orizabae*, are certainly very distinct. They actually represent new genera and we here erect *Platylactista* with genotype *aztecus* and *Leuronotina* with genotype, by monotypy, *orizabae*.

The characters which distinguish *Leuronotina* from its allies are given in the key on page 250.

### **Leuronotina orizabae** (Saussure)

Guadalajara, Jalisco, (D. L. Crawford), 1 ♂, [A. N. S. P.]. Distrito Federal, 1 ♀, [Mex. Govt.].

Quite a few of the specimens collected by C. C. Deam and recorded by Bruner are probably mislabelled as to locality. We are strongly of the opinion that this is true of the male of *orizabae* reported from Salina Cruz.

**Tomonotus ferruginosus** Bruner

This species has been recorded from Sonora and Sinaloa in Mexico. A female from Uruapan, Michoacan, is in the Academy collection, recorded as *Arphia behrensi* by Rehn in 1902, but corrected by Bruner in 1905.

**Tomonotus mexicanus** Saussure

We have examined the types of this handsome insect in the Geneva Museum, which we find came from Cuautla, Morelos. The species is best distinguished from *ferruginosus* by the more robust build and subvitreous light geranium pink (instead of less glossy grenadine (much less orange)) wing disk.

It has been reported correctly only from the States of Puebla, Morelos and Guerrero, all Rehn's records from Jalisco and Michoacan being here referred to species of *Lactista*.

**Derotmema haydeni mesembrinum** Rehn

When describing this race in 1919 Rehn recorded Mexican material from Monclova and Jimulco, Coahuila; Lerdo, Durango, and Camacho, Zacatecas.

Some of that material was recorded as *haydeni* by Bruner in 1906.

**Trachyrhachis kiowa fuscifrons** (Stål)

A pair from La Joya, San Luis Potosi, was recorded as *Mestobregma mexicana* by Rehn in 1904.

Alta Mira, Tamaulipas, VII, 15, 1903, (M. E. Hoag), 1 ♀, [A. N. S. P.]. Canales, Tamaulipas, VII, 6, 1908, 2 ♂, 1 ♀, [Illinois State and Hebard Cln.]. Rodriguez, Nuevo Leon, VI, 7, 1931, (A. Dampf; at light), 7 ♂, 6 ♀, [Mex. Govt. and Hebard Cln.]. Monterrey, Nuevo Leon, VII, 4 and 5, 1908, (Loma Larga, at light), 1 ♂, 1 ♀, [Illinois State and Hebard Cln.]; XI, 24, 1909, (F. C. Bishopp), 1 ♂, [U. S. N. M.].

**Trachyrhachis inconspicua** Bruner

San Juan Teotihuacan, Distrito Federal, 7500 feet, IX, 5, 1926, (H. B. Baker; high plains in arborescent *Opuntia* and *Yucca*), 1 ♂, [Univ. of Pa.].

This insect is nearest *mexicana* but may be distinguished by the less robust form, narrower fastigium, often smoother pronotal disk with median carina more prominent and caudal production more decided and more sharply acute and suffusions on wings very weak or obsolete.

**Trachyrhachis mexicana** (Saussure)

From examination of the male type and female allotype of *T. townsendi* Bruner from Colonia Garcia, Chihuahua, and comparison with the Mexican material now available, the former differ from the majority only in the broader wing band and slightly less roughened pronotum. These features are variable and we believe that *townsendi* constitutes rather a synonym than a geographic race.

From *kiowa fuscifrons* this species is distinguished by the very pale chalcedony yellow instead of bright lemon chrome tinge of the wing disk, the average slightly more robust form, more inflated head ventrad in females, more roughened pronotum and more lamellate dorsal margin of the caudal femora in proximal three-fifths. Though it would first appear that these insects were widely distinct, such is not the case and decided individual variation in both occurs.

Rehn recorded this insect in 1904 from Guadalajara, Jalisco, but his San Luis Potosi specimens then reported represent *kiowa fuscifrons*. Bruner repeated these records in 1906 and correctly reported *mexicana* from Tlalpam, Distrito Federal.

Durango, Durango, XI, 27, 1909, (F. C. Bishopp), 1 ♂, 2 ♀, [U. S. N. M. and Hebard Cln.]. Escuinapa, Sinaloa, (J. H. Batty), 2 ♂, 5 ♀, [A. M. N. H., U. S. N. M. and Hebard Cln.]. Guadalajara, Jalisco, (D. L. Crawford), 3 ♂, 1 ♀, [A. N. S. P.]. Zapopan, Jalisco, 5500 feet, IX, 11, 1903, (semi-arid upland), 1 ♀, [A. M. N. H.]. Pedregal near Mexico City, Distrito Federal, XII, 2, 1923, (on dry lawn among *Agave potatorum*), 1 ♂, [Hebard Cln.]. Texcoco, Distrito Federal, 1 ♂, [Mex. Govt.]. San Juan Teotihuacan, Distrito Federal, 7500 feet, IX, 5, 1926, (H. B. Baker; high plains with arborescent *Opuntia* and *Yucca*), 2 ♂, [Univ. of Pa. and A. N. S. P.]. Distrito Federal, 1 ♂, 1 ♀, [Mex. Govt.].

## MESTOBREGMA Scudder

Though, as now restricted, the genus is unknown from Mexico, it is probably widely distributed in the North, as *plattei corrugata* (Scudder), *plattei rubripenne* Bruner and *terricolor* Rehn have all been found in the southwestern United States to the Mexican boundary.

**Trimerotropis cristata** McNeill

The female from San Julio, Baja California, is here selected as type. The other originally described female, from the Salt Lake Valley, Utah, represented *bilobata* Rehn and Hebard.

Comondu, Baja California, III, 1889, (C. D. Haines), 1 ♀, [Hebard Cln.]. San Jorge, Baja California, III, 1889, (C. D. Haines), 2 ♀, [Hebard Cln.]. Santa Margarita Island, Baja California, III, 1889, (C. D. Haines), 2 ♀, [Hebard Cln.]. San Pedro Nolasco Island, Sonora, IV, 17, 1921, (E. P. Van-Duzee), 1 ♀, [Cal. Acad. Sci.].

The species in the United States is known only from Coronado, California, whence it has been recorded as *rebellis* and as *pseudofasciata*.

That *rebellis* will be found in the mountains of extreme northern Baja California is certain as we have taken it just across the line in extreme southern California.[21] Further study shows to our full satisfaction that *albolineata* Bruner is a synonym of *rebellis*.

**Trimerotropis pallidipennis pallidipennis** (Burmeister)

Forty-six males and fifty-two females of this very common species are from Nuevo Laredo, Tamaulipas; Rodriguez and Monterrey, Nuevo Leon; Monclova, Torreon and Saltillo, Coahuila; Guzman and Santa Rosalia Springs, Chihuahua; Nogales, Copete Mine and Hermosillo, Sonora; San Borja, El Paraiso and San José del Cabo, Baja California; Coatepec, Vera Cruz, Aguascalientes, Aguascalientes; Guadalajara, Jalisco; Contreras, Tlalpam, and San Juan Teotihuacan at 7500 feet on high plains, Distrito Federal; Popocatepetl Park; Cuernavaca and Jojutla, Morelos, and Ocotlan, Oaxaca.

This is the species which Saussure reported correctly but which has subsequently often been recorded from Mexico as the synonym *vinculata*. It was also recorded by Rehn as *monticola* in 1900 and as *fascicula* in 1901 and 1902, and these records were repeated by Bruner in 1906.

**Trimerotropis citrina** Scudder

Nuevo Laredo, Tamaulipas, XI, 24, 1905, (F. C. Bishopp), 2 ♂, [U. S. N. M. and Hebard Cln.]. Torreon, Coahuila, VII, 6, 1927, (in cotton fields), 1 ♀, [Hebard Cln.]. Guzman, Chihuahua, 4400 feet, VIII, 6 to 7, 1906, (P. P. Calvert), 1 ♂, 1 ♀, [A. N. S. P.].

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[21] Bruner's material from Phoenix, Arizona, recorded in 1906, was either mislabelled or misidentified.

**Trimerotropis huasteca** Saussure

We have examined the male type from Lake Metztitlan, Hidalgo, in the Geneva Museum, described as a variety of *monticola* and believe that a distinct species is represented.

San Luis Potosi, (E. Palmer), 3 ♂, 1 ♀, [Mus. Comp. Zool. and Hebard Cln.].

These specimens are very robust with unusually broad caudal femora. The tegminal bands are distinct but irregular. The wing band is of moderate width with heavy taenia reaching half way to base of wing and the apices are hyaline and very little suffused. The caudal femora are weakly but distinctly bifasciate externally and pink internally with meso-proximal area and a subapical annulus of brown slightly tinged with pink. The caudal tibiae are bittersweet orange, whitish proximo-externally but without an annulus there. The pronotal metazona is thickly tuberculate, much more thickly and heavily so than in *tolteca* or *melanoptera*.

Length of body ♂ 19.2 to 20.8, ♀ 29; length of pronotum ♂ 5.1 to 5, ♀ 7.2; length of tegmen ♂ 23.8 to 24.2, ♀ 30; length of caudal femur ♂ 11.8 to 12.2, ♀ 16; width of caudal femur ♂ 3.8 to 3.9, ♀ 5.3 mm.

**Trimerotropis tolteca modesta** Bruner

There remains no doubt but that *alliciens* Scudder, based on a female from La Cueva in the Organ Mountains of New Mexico, and probably *townsendi* Bruner, based on a series from Colonia Garcia, Chihuahua, in the author's collection are synonyms of *modesta* Bruner, based on females from Silver City, New Mexico.

Comparison with *tolteca* shows it to be so closely related that we believe that nothing more than racial recognition is warranted. This is emphasized by the fact that large series from the mountains of the southwestern United States show it to be subject to very decided individual variation. More material from central and southern Mexico is needed to definitely prove this racial assignment.

**Trimerotropis tolteca tolteca** Saussure

We here select as type the female from Oaxaca in the Geneva Museum. Another female is from Santa Cruz near Orizaba, Vera Cruz, taken in the region of pines. The originally described male is labelled simply "angang."

We have compared that material with Saussure's type of *monticola*, also in the Geneva Museum, a female from Perote, Vera Cruz, at 2600 meters, and find that name to be a synonym. It differs only in the narrower fastigium, which in our material of this species is seen to vary to an unusual degree; in having the wings distad clear instead of almost as suffused as the area of the wing band, and in the pink instead of buff internal pre-genicular annulus of the caudal femur. These latter features are found in this and other species to be individually variable, probably responses to different immediate environment.

San Lorenzo near Cordoba, Vera Cruz, (M. Trujillo), 1 ♂, [Hebard Cln.].

Length of body 17.2, length of pronotum 4.8, length of tegmen 21, greatest width of wing band 4.8, length of caudal femur 11 mm.

**Trimerotropis laticincta** Saussure

Rodriguez, Nuevo Leon, VI, 6 and 7, 1931, (A. Dampf; at light), 1 ♂, 2 ♀, [Mex. Govt. and Hebard Cln.].

These specimens are large and robust with markings sharp and very strongly contrasting. They closely resemble material from Marathon and Allamore, Texas, having a very distinct appearance from all Great Plains series.

**Trimerotropis melanoptera** McNeill

Nogales, Sonora, VIII, 12, 1906, (P. P. Calvert), 1 ♀, [A. N. S. P.]. Escuinapa, Sinaloa, (J. H. Batty), 8 ♂, 4 ♀, [A. M. N. H. and Hebard Cln.].

These specimens, though having the wing band extremely wide, differ from typical material in that this band is slightly narrower so that the taenia projects beyond its inner margin toward the base of the wing.

In 1906 Bruner recorded as *pistrinaria* two males and two females typical of *melanoptera* from Colonia Garcia, Chihuahua, but the specimens so recorded from Durango and Zacatecas differ in that the wing band, though broad, is much narrower. We await additional material to determine whether or not a distinct geographic race is represented by the latter.

**Trimerotropis lauta** Scudder

A male and two female topotypes from Guadalupe Island off the coast of Baja California are in the Museum of Comparative Zoology and the author's collection. Though discolored from immersion in alcohol, they, like the type, are distinctive in lacking all trace of a wing band.

Bruner omitted the species in the "Biologia Centrali-Americana."

**Conozoa carinata** Rehn

Nogales, Sonora, VIII, 12, 1906, (P. P. Calvert), 2 ♂, [A. N. S. P.].

Individually the fastigial width varies greatly in this species. In the present specimens it is very narrow.

**Heliastus parviceps** (F. Walker)

Chihuahua City, Chihuahua, 4700 feet, VIII, 16 to 18, 1906, (P. P. Calvert), 1 ♀, [A. N. S. P.]. Monclova, Coahuila, XI, 27, 1909, (F. C. Bishopp), 1 ♂, [U. S. N. M.]. Desert between Navajoa and Cajeme, Sonora, III, 27, 1927, 1 ♂, [Mex. Govt.].

This is the species we have recorded from Baja California as the synonym *aridus*.

**Heliastus benjamini** Caudell

Escuinapa, Sinaloa, (J. H. Batty), 1 ♀, [A. M. N. H.].

The author first recorded this species from Mexico in 1925, from Rosario, Sinaloa, at that time comparing it with the closely related *aztecus* Saussure.

**Heliastus sumichrasti** Saussure

Saussure's *Oedipoda tentatrix* and Rehn's *Lactista inermis* are established synonyms.

Tampico, Tamaulipas, XII, 1906, 1 ♀, 1 juv. ♀; XII, 28, 1908 and I, 2, 1909, 1 ♂, 5 ♀, [Ill. State Lab. and Hebard Cln.]. Valles, San Luis Potosi, I, 6, 1907, 5 ♂, 5 ♀, [Ill. State Lab. and Hebard Cln.]. Mazatlan, Sinaloa, II, 21, 1918, (J. A. Kusche), 1 ♀ (wing disk buff yellow), [Hebard Cln.]. Villa Union, Sinaloa, IX, 27, 1918, (J. A. Kusche), 1 ♂, 1 ♀ (wing disk bittersweet orange), [Hebard Cln.]. Guadalajara, Jalisco, (D. L. Crawford), 3 ♀, [A. N. S. P.]. Colima, Colima, 1 ♀ (wing disk light orange), [Mex. Govt.]. Vera Cruz, Vera Cruz, XI and XII, 1887, (L. Bruner), 1 ♂, 4 ♀, [Hebard Cln.]; 1 ♀ (wing disk light pink), [Mex. Govt.]. Coatepec, Vera Cruz, 1 ♀ (wing disk pink), [Mex. Govt.]. Orizaba, Vera Cruz, I, 1892, (L. Bruner), 2 ♂, 7 juv., [Hebard Cln.]. Atoyac, Vera Cruz, V and XII, 1887, (Smith; Schumann; Bruner), 4 ♂, 5 ♀, [Hebard Cln.]. Cordoba, Vera Cruz, (Hoege; Trujillo), 1 ♂, 1 juv. ♀, [Hebard Cln.]. Necaxa, Puebla, 1250 to 1350 meters, VII, 21 and 31, 1926, (H. B. Baker; on rock talus), 2 ♂, [A. N. S. P.]. Cuernavaca, Morelos, 1 ♂, 1 ♀, [Mex. Govt.]. Temisco, Guerrero, X to XI, 1928, (T. W. Bouchelle), 1 ♂, 1 ♀, [A. N. S. P.]. Iguala, Guerrero, IX, (O. W. Barrett), 1 ♂, [Hebard Cln.]. Rio Papagaio, Guerrero, 1200 feet, (H. H. Smith), 1 ♀, [Hebard Cln.]. Acaguizotla, Guerrero, X, (H. H. Smith), 1 ♀, [Hebard Cln.]. Rio Cocula, Guerrero, 1 ♂, [Hebard Cln.]. Ocotlan, Oaxaca, III, 5 to 21, 1922, (J. J. White), 1 ♂, 2 ♀, [Hebard Cln.]. Temax, Yucatan, (G. F. Gaumer), 3 ♀, [Hebard Cln.]. Merida, Yucatan, (G. F. Gaumer), 3 ♀, [Hebard Cln.].

The wing disk is light strawberry pink to grenadine unless otherwise noted.

## BATRACHOTETRIGINAE

### PHRYNOTETTIX Glover

Both Rehn's study of this genus in 1903 and Bruner's treatment of the species in 1906 are found, from large series now before us from the southwestern United States, to be seriously in error, due to the failure in both cases to treat features purely of individual variation as such.

Thus Rehn's assignment of *verruculata* and *magna* to synonymy under *tschivavensis* is correct, though his *taosanus* is a synonym of that species, while Bruner incorrectly considered all of these names valid.

Moreover *robusta* is a very distinct species, not another synonym as Rehn supposed, but in spite of this, Bruner's immature material from Durango, which he so reported in 1906, actually represents *tschivavensis*.

**Phrynotettix tschivavensis** Haldeman

Jaral, Coahuila, XII, 1 to 3, 1909, (J. Friesser), 1 ♂, [Hebard Cln.]. Lerdo, Durango, XI, (L. Bruner), 1 small juv. ♀, recorded by Bruner as *robusta*, [Hebard Cln.].

**Phrynotettix robustus** (Bruner)

Casas Grandes, Chihuahua, 1 ♀, [British Mus.]. Jaral, Coahuila, XII, 1 to 3, 1909, (J. Friesser), 2 ♂, 7 ♀, [Field Mus. and Hebard Cln.]. Moctezuma, Chihuahua, V, 1893, 1 ♂, [Hebard Cln.].

In one female only the caudal femora have the ventro-internal portion of the ventral surface, but not the internal surface, largely blackish brown.

**Brachystola magna** (Girard)

We synonymized *intermedia* Bruner in 1929 and noted the apparent position of *virescens*, stating that all of Bruner's records of that insect were based on material of *magna*.

San Nicolas de Carretas, Chihuahua, IX, 12, 1930, 4 ♂, 2 ♀, [Mexican Govt. and Hebard Cln.]. Jiminez, Chihuahua, (Rocha), 1 ♂, 1 ♀, [Mex. Govt.]. Chihuahua City, Chihuahua, 4700 feet, VIII, 16 to 18, 1906, (P. P. Calvert), 2 juv. ♀, [A. N. S. P.]. San Juan del Rio, Durango, (Ortega), 1 ♂, [Hebard Cln.]. Durango, (O. W. Barrett), 1 ♀, [Hebard Cln.]. Sonora, (C. Lumholtz), 1 ♂, [A. M. N. H.].

**Brachystola ponderosa** Bruner

Copete Mine, 30 miles East of Carbo, Sonora, (F. C. Nicholas), 5 ♂, 4 ♀, [A. M N. H. and Hebard Cln.]. Hermosillo, Sonora, X, 31, 1929, (in corn and beans), 1 ♂, 4 ♀, [Mex. Govt.].

**Brachystola mexicana** Bruner

Chalchihuetes, Zacatecas, (Vanegas), 9 ♂, 8 ♀, [Mex. Govt. and Hebard Cln.]. Sombrerete, Zacatecas, (in beans), 2 ♂, 2 ♀, [Mex. Govt.].

**Brachystola eiseni** Bruner

Ixtlan, Nayarit, 2 juv., [Mex. Govt.]. Tetitlan, Nayarit, VII, 5, 1929, 1 ♂, 5 ♀, [Mex. Govt. and Hebard Cln.]. Ahuacatlan, Nayarit, IX, 12 to XI, 3, 1930, 3 ♂, 6 ♀ (1 ♀ green phase), [Hebard Cln.]. Mazatlan, Sinaloa, (Magana; in sugar cane), 1 large juv. ♀, [Mex. Govt.]. Villa Corona, Jalisco, 6 juv., [Mex. Govt. and Hebard Cln.]. Guadalajara, Jalisco, IX, 10, 1930, 2 ♀, [Mex. Govt. and Hebard Cln.]. San Martin, Jalisco, IX, 19, 1930, (in sugar cane), 1 ♀, [Hebard Cln.]. Colima, Colima, X, 1927, 2 ♂, 2 ♀, 1 juv., [Mex. Govt. and Hebard Cln.].

The caudal tibiae have their extensor surfaces, inner spines and inner surfaces of outer spines rich pink. This is not evident in the original series, apparently dried after immersion in alcohol.

## PYRGOMORPHINAE

**Sphenarium minimum** Bruner

The Mexicanum Group with elongate fastigium and weak medio-longitudinal pronotal carina reaches its maximum depauperation in the present insect.

Progressive stages in increase in size and brilliancy of coloration are apparently shown by *bolivari* Bruner and *ictericum* Gerstaecker, reaching an extreme optimum in *histrio* Gerstaecker.

In a large series of *histrio* before us, that insect is seen to vary from males much less conspicuously marked than the type of *bolivari* and wholly immaculate green females to the most brilliant black, red and yellow individuals of both sexes.

The number of species or races which should be recognized is uncertain, and much material with data not only as to locality but also immediate environment must be secured before the problem can be satisfactorily studied.

Coatepec, Vera Cruz, V and VI, 1922, (Conradt), 1 ♂, 1 ♀, [Hebard Cln ].

**Sphenarium mexicanum** Saussure

It appears probable that Bruner's *affine* and *marginatum* are synonyms, the former based on a depauperate condition, the latter on a color phase, both occurring at Orizaba, Vera Cruz. The male type of these and a female paratype of *mexicanum* are in the author's collection, as well as twenty-four other specimens apparently referable to this species.

As we have noted under *minimum,* much field work is needed, but it is already evident that in *mexicanum* great size variation occurs and that there is also a very wide range between the extremes of intensification and recession of color pattern.

The following previously unreported specimens are before us: Cordoba, Vera Cruz, 850 meters, IX, 7, 1926, (H. B. Baker; in weeds and brush on limestone hills, Las Tortolas), 1 ♂, [Univ. of Pa.]; X, 19, 1924, 1 ♂, 1 ♀, [Hebard Cln.]. Orizaba, Vera Cruz, IX, 1, 1903, (W. L. Tower), 2 ♂, 2 ♀, [A. M. N. H.]. Potrero, Vera Cruz, X, 28, 1924, 1 ♂, [Hebard Cln.]. Villa de Mar, Vera Cruz, IX, 21, 1924, 4 ♂, 1 ♀, [Mex. Govt. and Hebard Cln.].

**Sphenarium histrio** Gerstaecker

We have noted above the difficulties in the Mexicanum Group. There is strong reason to believe that *ictericum* Gerstaecker is a synonym of *histrio* and the same is probably true for *bolivari* Bruner. Indeed *histrio* may only represent a very striking optimum development of *mexicanum.*

Almoloyas, Oaxaca, XI and XII, 1922, (J. J. White), 16 ♂, 22 ♀, [Hebard Cln.]. Santa Lucrecia, Isthmus of Tehuantepec, Vera Cruz, X, 1922, (J. J. White), 12 ♂, 7 ♀, [Hebard Cln.]. Tabasco, 2 ♀, [Mex. Govt. and Hebard Cln.].

Great individual variation in both size and amount of marking is shown by this series. Individuals range from the very largest and most brilliantly colored we have seen of the Mexicanum Group to others no larger than and no more richly colored than the largest and most richly colored examples of *mexicanum* before us. Extremes in length of body are: ♂ 26.2 to 37.2, ♀ 29 to 36.3 mm.

**Sphenarium rugosum** Bruner

Cuernavaca, Morelos, XII, 1910, 1 ♀ (brown), [Mex. Govt.].

This is apparently the species usually encountered at this, the type locality. The present specimen is very like the allotype female, in the author s collection, differing only in being slightly larger.

**Sphenarium purpurascens** Charpentier

Tlalpam, Distrito Federal, IX, 7 and 16, 1923, (fallow land and border of corn field), 2 ♂, 2 ♀, [Hebard Cln.]. Distrito Federal, 2 ♂, 6 ♀, [Mex. Govt.].

Two males and a female of the present series are strikingly marked as figured by Charpentier, the darker coloration being, however, a very deep purplish brown, the name being probably decidedly more accurate than the coloring of the original plate. Two females are brown with an olivaceous tinge and three are uniform green. Those not strikingly marked are best separated from material of *minimum* by the average more robust form and definitely shorter fastigium.

In 1884 Bolivar described *Pyrgomorpha dispar* from Mexico. The material is surely incorrectly labelled, as that genus is confined to the Old World.

**Icthyotettix mexicanus** (Saussure)

Cuernavaca, Morelos, VIII, 1911, 1 ♂, [Hebard Cln.]. Morelos, (A. Koebele), 1 ♀ (brown), [Hebard Cln.].

Two green females from Puebla, Mexico and La Barca, Jalisco, V, 1920, (Conradt) are also in the author's collection. Their slightly narrower fastigium, even less distinctly concave facial profile and immaculate pronotum, may possibly indicate specific or racial differentiation.

### ICTHIACRIS Bolivar

This genus, erected by Bolivar in 1905, of which *rehni* Bolivar from Baja California was selected as genotype by Kirby in 1910, we find to be distinct from *Calamacris* Rehn, described in 1904, with monotypic genotype that author's *clendoni* from Guadalajara, Jalisco.

All material, however, from Baja California which has been referred to *Calamacris* clearly belongs to the present genus.

These related genera may be separated as follows.

A. Antennae with no joints showing projection. Fastigium with lateral margins convergent. Head and pronotum carinulate and impresso-punctate, tuberculations inconspicuous if present. Caudal margin of metazona almost transverse, the median obtuse-angulate emargination weak. Prosternum strongly tumid, not tuberculate.[22] Male cerci small, simple, not surpassing apex of supra-anal plate. Baja California. *Icthiacris* Bolivar

AA. Antennae with a few proximal joints showing sharply rounded production of their dorso-external distal angles. Fastigium with lateral margins parallel or very faintly convergent. Head and pronotum very conspicuously tuberculate, moderately carinulate. Caudal margin of metazona decidedly obtuse-angulate emarginate. Prosternum strongly tumid with apex a minute tubercle. Male cerci elongate, slender, flattened, curved, greatly surpassing apex of subgenital plate. Jalisco..... ..........................*Calamacris* Rehn

**Icthiacris aptera** new name

1906. *Calamacris californica* Bruner (not *Icthiacris californica* Bolivar, 1905), Biol. Cent.-Amer., Orth., II, p. 201, pl. 4, figs. 24, 25 and 25a. [♂, ♀; San José del Cabo, Baja California.]

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[22] Bolivar says there is a small tooth in his type of *costulata*. We can not help questioning the accuracy of that statement.

The originally described series is in the author's collection; the type, Number 292, is a male.

This handsome species is quickly distinguished from *costulata* by the stouter form, shorter fastigium, broader interocular space, complete absence of tegmina and smoother surface.

**Icthiacris mexicana** (Bruner)

Bruner's *Calamacris oculata* is an established synonym.

Comondu, Baja California, III, 1889, (C. D. Haines), 1 juv. ♀, [Hebard Cln.]. Corral de Piedra, Sierra El Taste, Baja California, IX, 8, 1898, (G. Eisen), 1 ♂, [Hebard Cln.].

**Icthiacris costulata** Bolivar

1905. *I[cthiacris] costulata* Bolivar, R. Soc. Espanola Hist. Nat., v, p. 288. [♀; Baja California.]

1906. *Calamacris palmeri* Bruner, Biol. Cent.-Amer., Orth., ii, p. 202. [♀; Cape St. Lucas, Baja California.]

Study of the description of *costulata* and the type of *palmeri* in the author's collection convinces us that the latter, probably described without knowledge that Bolivar's paper had appeared, is a synonym.

Though *rehni* Bolivar apparently represents a distinct species, the status of his *californica* appears to be very uncertain. In addition Bruner's *Calamacris mexicana* (with his *Calamacris oculata* a synonym) is also uncomfortably close to *costulata*.

The validity of these names can only be decided when much larger series of the genus from Baja California, with full data both as to locality and conditions of immediate environment, can be studied.

**Xyronotus aztecus** Bolivar

Orizaba, Vera Cruz, IV and V, (F. Sumichrast), 3 ♂, 2 ♀, taken with type, [Hebard Cln.].

## CYRTACANTHACRINAE

**Procolpia inclarata** (Walker)

Cordoba, Vera Cruz, 850 meters, IX, 7, 1926, (H. B. Baker; in weeds and brush on limestone hills, Las Tortolas), 1 ♂, [A. N. S. P.]. Atoyac, Vera Cruz, (Schumann), 1 juv. ♂, [Hebard Cln.]. El Zapote, Pacific slope of Sierra Madre, Chiapas, 400 meters, XI, 12, 1930, (on coffee tree), 1 ♀, [Mex. Govt.]

We find *emarginata* (Serville), based on a female from Brazil, to represent a distinct species, as we first noted in 1924. The Mexican *inclarata* is not a synonym, as was indicated by Uvarov the following year.

**Cibotopteryx variegata** Rehn

La Zacualpa, Chiapas, VIII, 1909, (A. Petrunkevitch), 1 ♂, [A. M. N. H.].

This is the first Mexican record of this distinctive Central American genus. The specimen agrees closely with the Costa Rican type in the Academy collection, differing only in the slightly larger size, slightly sturdier and longer femora and caudal tibiae with internal spines slightly more curved and appreciably more elongate.

**Diedronotus centralis** Rehn

Almoloyas, Oaxaca, XI, 1922, (J. J. White), 3 ♂, 6 ♀, [Hebard Cln.].

These are the first specimens to be recorded since the originally described Costa Rican females.[23]

Length of body ♂ 35.4 to 37.3, ♀ 52 to 61; length of pronotum ♂ 15 to 15.2, ♀ 20 8 and 23.7; greatest width of pronotal disk ♂ 6.9 to 7.2, ♀ 9.4 to 11.3; length of tegmen ♂ 29.7 to 31.7, ♀ 40.7 to 47; length of caudal femur ♂ 23.2 to 24, ♀ 31.6 to 37 mm.

**Diedronotus mexicanus** (Bruner)

The type, a male from Temax, Yucatan, taken by Gaumer, is in the author's collection. In addition there are the following paratypes, not previously fully recorded.

Vera Cruz, Vera Cruz, (T. Heyde), 1 ♂, 2 ♀, 1 juv. ♀. Valladolid, Yucatan, (Gaumer), 1 ♂, 2 ♀. Izamal, Yucatan, (Gaumer), 1 ♂. Merida, Yucatan, (Gaumer), 2 ♂, 8 ♀.

We would here note that in the Biologia Centrali-Americana Bruner, in a number of cases, included species which had not been and will probably never be found south of the United States. One of these is *Romalea microptera,* there mentioned as *Dictyophorus micropterus* as well as the synonym *marci.*

Widespread in the southeastern United States, this handsome insect reaches West in Texas little beyond the boundary of the humid eastern zone. Its known southwestern limit is Victoria, Texas, a locality separated from the Mexican line by over one hundred and fifty miles of territory which is largely more arid than any in which the species is known to be able to exist.

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[23] Trans. Amer. Ent. Soc., XLIV, p. 329, pl. 18, figs. 7 and 8, (1918).

**Taeniopoda eques** (Burmeister)[24]

Chihuahua City, Chihuahua, 4700 feet, VIII, 16 to 18, 1906, (P. P. Calvert), 1 juv. ♂, [A. N. S. P.]. Tepic, Nayarit, IX, 28, 1929, (in corn), 1 ♂, [Mex. Govt.]. Guadalajara, Jalisco, (D. L. Crawford), 2 ♂, 3 ♀, [A. N. S. P.]. Tapachichi, Zacazonapan, 1 ♀, [Mex. Govt.].

As previously noted in material from Guadalajara, the dark portions of the pronotum are either blackish or yellow-brown, this being a striking color difference from the normal.

**Taeniopoda stali** Bruner

Cuernavaca, Morelos, VII and VIII, 1903, (W. L. Tower), 2 moderately large juv. ♂, [A. M. N. H. and Hebard Cln.]; VIII, 1911, 1 ♀, [Mex. Govt.].

**Taeniopoda auricornis** (Walker)

Vera Cruz, Vera Cruz, 1 ♀, [Mex. Govt.]. Coatepec, Vera Cruz, V and VI, 1922, (Conradt), 10 ♂, 7 ♀, [Mex. Govt. and Hebard Cln.].

**Taeniopoda citricornis** Bruner

Almoloyas, Oaxaca, XI, 1922, (J. J. White), 2 ♂, 8 ♀, [Hebard Cln.].

Structurally these specimens agree quite closely with the specimens here referred to *varipennis*. Bruner's figure is either poor or the type of *citricornis* has a much lower crest than there shown.

Length of body ♂ 40.8 to 43.2, ♀ 57.2 to 56; length of pronotum ♂ 15.7 to 16, ♀ 19.2 to 22.1; greatest width of pronotal disk ♂ 7.2 to 7, ♀ 8.9 to 9.6; length of tegmen ♂ 39 to 36.7, ♀ 33.8 to 36.9; length of caudal femur ♂ 24.3 to 25.8, ♀ 25.3 to 29 mm.

This insect is apparently distinguishable from *varipennis* by the more extensive dark markings and pronotum with median and (usually) the lateral carinae (from second sulcus to caudal margin) heavily black.

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[24] See our revision of this genus, Trans. Amer. Ent. Soc., L, pp. 253 to 274, (1925).

**Taeniopoda varipennis** Rehn

Santa Lucrecia, Vera Cruz, X, 1922, (J. J. White), 4 ♂, [Hebard Cln.].

**Chromacris colorata** (Serville)

La Buena Ventura, Vera Cruz, 1909, 12 juv., [A. M. N. H.]. Coatepec, Vera Cruz, V and VI, 1922, (Conradt), 3 ♂, 1 ♀, [Mex. Govt.]. Sengolica, southeast mountainous Vera Cruz, (injuring coffee and sugar cane), 1 ♂, [Hebard Cln.]. Cordoba, Vera Cruz, 850 meters, IX, 7, 1926, (H. B. Baker), 1 ♂, [Univ. of Pa.]; X, 15, 1924, 1 ♂, [Mex. Govt.]. Vera Cruz, Vera Cruz, (T. Heyde), 1 ♂, 2 ♀, [Hebard Cln.]. Motzorongo, Vera Cruz, II, 1892, (L. Bruner), 2 ♂, 3 ♀, [Hebard Cln.]. Medellin, Vera Cruz, IX, 1895, 1 ♂, 1 ♀, [Hebard Cln.]. Cuautla, Morelos, VII and VIII, 1903, (W. L. Tower), 10 juv., [A. M. N. H.]. Matamoros, Morelos, VIII, 12, 1903, (W. L. Tower), 5 ♂, 9 ♀, 2 juv., [A. M. N. H.]. Cuernavaca, Morelos, VIII, 1911, 1 ♂, [Mex. Govt.]. La Barranca de los Obledos, Jalisco, IX, 13, 1903, (on limestone cliff), 1 ♂, [Hebard Cln.]. Colima, Colima, 1 ♀, [Mex. Govt.]. Chichen Itza, Yucatan, (E. Thompson), 2 ♂, 2 ♀, (paler network of tegminal venation terracotta instead of the usual dull yellowish green), [Field Mus. and Hebard Cln.]. Almoloyas, Oaxaca, XI, 1922, (J. J. White), 1 ♂, 1 ♀, [Hebard Cln.].

**Lophacris olfersii** (Burmeister)

This name, properly proposed for the preoccupied *Gryllus flavicornis* Stoll, is older than and consequently has as synonyms Nieto's *velasquezii* and Serville's *semirubrum*.

We believe that *olfersii* has a very extensive distribution through tropical America. Scudder's *humboldtii* is extremely close and may prove to represent only the optimum development of this species.

Chichen Itza, Yucatan, (E. Thompson), 1 ♀, [Field Mus.].

The wings except distad are rose doree with a faint purplish tinge, the veins deeper than the intervening surfaces. Length of body 90.3, length of pronotum 21.7, width of pronotal disk 13, length of tegmen 79, length of caudal femur 39.7 mm.

**Tropidacris dux** (Drury)

Pictet and Saussure's *imperialis* has been placed as a synonym and it is now evident that the same is true of their *cardinalis*.

The material which Bruner reported in 1907 is before us and shows that he was generally confused.

Chichen Itza, Yucatan, (E. Thompson), 1 ♀, [Field Mus.].

We can now state definitely that *dux* occurs from Vera Cruz to Nicaragua and that this species is wholly supplanted by *latreillei* (Perty) in Costa Rica, Panama and northern South America. We know Bruner's statement that he saw an individual of *dux* near Omaha, Nebraska, to be an error. Scudder reported a specimen from "Texas" in 1869, which undoubtedly was mislabelled. The species of the genus live in tropical forests. Certainly they will not be found in temperate plains environment. They are much more sluggish in their movements than the species of *Schistocerca* and allied genera.

**Leptysma marginicollis** (Serville)

We have recently published conclusive evidence that Saussure's *mexicana* is a synonym.

Tampico, Tamaulipas, XII, 29, 1906, 2 ♂, [Ill. State Lab. and Hebard Cln.]. Guadalajara, Jalisco, (D. L. Crawford), 1 ♀, [A. N. S. P.] Xico, Vera Cruz, IX, 13, 1906, (P. P. Calvert), 1 large juv. ♂, [A N. S. P.]. Santa Lucrecia, Vera Cruz, X, 1922, (J. J. White), 2 ♀, [Hebard Cln.]. Irapuato, Guanajuato, XI, 11, 1927, (on swamp plants), 2 ♂, 2 ♀, 2 juv., [Mex. Govt. and Hebard Cln.].

**Opshomala vitreipennis** (Marschall)

Tampico, Tamaulipas, XII, 29, 1906, (from grass near river), 1 ♂, [Hebard Cln.]. Coatepec, Vera Cruz, 1 ♀, [Mex. Govt.]. Vera Cruz, Vera Cruz, II, 21, 1926, 1 ♀, [Hebard Cln.].

In 1925 we found *marschalli* (Bruner) to be distinct from *vitreipennis*. After careful analysis of larger series than previously available we feel obliged to modify that opinion, so slight is the differentiation shown. We feel that poorly defined geographic races are what are actually represented: *vitreipennis vitreipennis* from the southeastern United States and *vitreipennis marschalli* of Costa Rica; Mexican material being almost intermediate. The former has the eyes averaging very slightly more elongate and less protuberant and the male subgenital plate very slightly narrower than the latter.

**Inusia chipmani inornatipes** Bruner

It is evident from study of the original series in the author's collection from San Rafael, Vera Cruz, that *inornatipes* is nothing more than a race, possibly merely a variation, of *chipmani*.

Tampico, Tamaulipas, XII, 1906, 1 ♀, [Hebard Cln.]. Medellin, Vera Cruz, (T. Heyde), 2 ♂, [Hebard Cln.].

**Inusia chipmani chipmani** Bruner

Vera Cruz, Vera Cruz, I, 15, 1927, 2 ♂, 1 ♀, [Mex. Govt. and Hebard Cln.]. Temax, Yucatan, (Gaumer), 1 ♂, [Hebard Cln.]. Isthmus of Tehuantepec, 1 ♂, 2 ♀, [Mex. Govt.].

In 1924 we placed Bruner's *nana* and *bicolor* as synonyms.

**Proctolabus mexicanus** (Saussure)

Matamoros, Puebla, XII, 1 ♀, [Hebard Cln.]. Chietla, Puebla, XI, 1 ♂, 1 ♀, [Hebard Cln.]. Cuernavaca, Morelos, IX, 1923, (E. G. Smith), 1 ♂, 1 ♀, [Hebard Cln.]. Iguala, Guerrero, 1929, (H. Krueger), 1 ♀, 2 juv. ♀, [A. N. S. P.].

**Proctolabus brachypterus** Bruner

In 1925 we corrected Rehn's 1904 record of this species as *mexicanus*.

Guadalajara, Jalisco, (D. L. Crawford), 4 ♂, 1 ♀, [A. N. S. P. and Hebard Cln.].

These specimens and others previously recorded from Guadalajara show distinctly less reduction of the organs of flight (♂ 11 to 12.7, ♀ 13.7 to 14.3 mm ) than do the originally described pair in the author's collection from "Jalisco" (♂ 9.3, ♀ 9.8 mm.).

**Tela chlorosoma** Hebard

When describing this species[25] we explained that the female from Teapa, Tabasco, referred to *Anniceris viridulus* by Bruner in 1908, actually represents the present insect.

**Tela viridulus** (Bruner)

Known only from a male from Atoyac, Vera Cruz, females are awaited with interest to verify our opinion that the species is referable to our genus *Tela*.

**Psilotettix obesus** Bruner

Cape San Lucas, Baja California, (Xantus), 1 ♀, [Mus. Comp. Zool.].

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[25] Ent. News, XLIII, p. 100, (1932).

**Abracris obliqua** (Thunberg)

Rehn placed *Omalotettix signatipes* Bruner as a synonym in 1916. Material was recorded under that name and possibly as *nebulosa* from Acapulco, Guerrero, and Temax and Valladolid, Yucatan by Bruner in 1906.

Merida, Yucatan, (Gaumer), 4 ♂, 3 ♀, [Hebard Cln.]. Chichen Itza, Yucatan, (E. Thompson), 4 ♂, 15 ♀, [Field Mus.]. Tierra Colorado, Guerrero, 2000 feet, X, (H. H. Smith), 1 ♀, [Hebard Cln.]. Dos Arroyos, Guerrero, 1000 feet, IX, (H. H. Smith), 2 ♀, [Hebard Cln.].

**Abracris nebulosa** Bruner

It is now evident that a second species of this genus occurs in western Mexico, which in 1925 we recorded as *obliqua* from Venvidio, Sinaloa. From *obliqua* it differs in the larger size, graceful form which is broader at the shoulders but tapers more cephalad and caudad, postocular bar declivent and not following the dorsal margin of the pronotal lateral lobes, pale oblique band on pleura no paler than its continuation dorso-laterad on the pronotum, wings tinged weakly with green-yellow and caudal femora which have two broad and weakly darker but unbroken lateral bands and the ventro-external surfaces entirely and evenly dark.

This insect we refer to *nebulosa.* Though both species here recorded were described from South America, this North American material agrees quite closely with South American specimens of these species in the Philadelphia collections. It is further evident that species of *Abracris* are decidedly variable and in some cases have an enormous range of distribution. As a result we are certain that revision is needed, when material of the genus from all parts of its distribution can be assembled.

Escuintla, Chiapas, (D. L. Crawford), 1 ♀, [Hebard Cln.]. Almoloyas, Oaxaca, XI, 1922, (J. J. White), 1 ♀, [Hebard Cln.].

**Osmilia flavolineata** (DeGeer)

In 1924 we placed Scudder's *labrata* and *saussurei* as synonyms and in 1925 added to these Saussure's *tolteca.*

Vera Cruz, Vera Cruz, (T. Heyde), 7 ♀, [Hebard Cln.]. Medellin, Vera Cruz, XI, 1895, (L. Bruner), 2 ♂, 2 ♀, [Hebard Cln.]. San Rafael, Vera Cruz, VII, 6 ♂, 10 ♀, [Hebard Cln.]. Coatepec, Vera Cruz, 3 ♀, [Mex. Govt.]. Isthmus of Tehuantepec, 1 ♂, [Mex. Govt.]. Cuernavaca, Morelos, 1 ♂, 1 ♀, [Hebard Cln.]. Jojutla, Morelos, III, 1929, (J. J. White), 1 ♀, [Hebard Cln.]. Tepic, Nayarit, (G. Eisen), 3 ♂, 1 ♀, [Cal. Acad. Sci.]. Rio Cocula, Guerrero, XII, 1895, (O. W. Barrett), 1 ♂, [Hebard Cln.]. Rio Papagaio, Guerrero, 1200 feet, X, (H. H. Smith), 1 ♀, [Hebard Cln.]. Palomares, Oaxaca, 1909, 1 ♀, [A. M. N. H.]. Temax, Yucatan, (G. F. Gaumer), 1 ♂, 1 ♀, [Hebard Cln.]. Merida, Yucatan, (G. F. Gaumer), 1 ♂, 3 ♀, [Hebard Cln.]. Chichen Itza, Yucatan, (E. Thompson), 2 ♀, [Field Mus.].

**Vilerna pygmaea** (Saussure)

Vera Cruz, Vera Cruz, I, 16, 1927, 7 ♂, 5 juv., [Mex. Govt.]. Atoyac, Vera Cruz, V, (H. H. Smith), 2 ♀; (Schumann), 1 ♀; XI, 1887, (L. Bruner), 1 small juv. ♀, [all Hebard Cln.]. San Rafael, Vera Cruz, (C. H. T. Townsend), 1 ♂, 1 ♀, [Hebard Cln.]. Motzorongo, Vera Cruz, II, 1892, (L. Bruner), 1 ♀, 1 large juv. ♀, [Hebard Cln.]. Fórtin, Vera Cruz, V, (H. H. Smith), 1 ♂, [Hebard Cln.]. Coatepec, Vera Cruz, 4 ♂, 1 ♀, [Mex. Govt.]. Cordoba, Vera Cruz, 750 meters, IX, 9, 1926, (H. B. Baker; near Potrero), 1 ♂, [Univ. of Pa.]. Texolo, Vera Cruz, VII, 3, 1899, (S. N. and M. C. Rhoads), 1 large juv. ♀, [A. N. S. P.]. Necaxa, Puebla, 1400 meters, VII, 19, 1926, (H. B. Baker; grassy mountainside), 1 ♂, [Univ. of Pa.]. Teapa, Tabasco, III, (H. H. Smith), 1 ♂, 3 ♀, [Hebard Cln.]. Valladolid, Yucatan, (G. F. Gaumer), 1 ♂, [Hebard Cln.]. Temax, Yucatan, (G. F. Gaumer), 1 ♀, [Hebard Cln.]. Isthmus of Tehuantepec, 1 ♀, [Hebard Cln.].

The Vera Cruz specimens agree closely with paratypes from Orizaba in the author's collection. The Tabasco individuals are much larger.

The species is apparently best distinguished from *aeneo-oculata* (DeGeer) by the decidedly larger and more strongly projecting vertex.

**Schistocerca vitticeps carinata** Scudder

This insect may well prove indistinguishable from *vitticeps;* it is surely at best only a northeastern geographic race. Decided variation is shown by the material before us, with no recognizable break between the extremes to separate the series. We believe, however, that it would be rash at the present time to indicate synonymy.

We here select Venis Mecas, Mexico as type locality of *zapoteca* Scudder. That name then becomes a synonym of *vitticeps carinata*.

Tampico, Tamaulipas, XII, 1906, 9 ♂, 6 ♀, [Ill. State. Lab. and Hebard Cln.]. El Abra, San Luis Potosi, I, 15, 1906, (bank of Rio Choy), 1 ♀, [Ill. State. Lab.]. Valles, San Luis Potosi, I, 6, 1907, 1 ♀, [Ill. State. Lab.]. San Rafael, Vera Cruz, (C. H. T. Townsend), 3 ♂, 1 ♀, [Hebard Cln.]. Pueblo Viejo, Vera Cruz, XII, 8, 1909, (F. C. Bishopp), 1 ♂, [U. S. N. M.]. Jalapa, Vera Cruz, VI, 22, 1896, (Barrett; Smith), 3 ♀, [Hebard Cln.]. Coatepec, Vera Cruz, 8 ♂, 2 ♀, [Mex. Govt. and Hebard Cln.]. Potrero, Vera Cruz, X, 28, 1924, (in sugar cane), 1 ♂, [Hebard Cln.].

Large series from Vera Cruz, Texolo and Orizaba in Vera Cruz (in part recorded as *pyramidata* by Rehn in 1902), including paratypes, are also before us.

**Schistocerca vitticeps vitticeps** (Walker)

Scudder's *pyramidata*, described from Cuernavaca, Morelos, is beyond doubt this insect, as indicated by Kirby in 1910. Rehn had frequently recorded the race under that name. Walker's *proprium* is probably another synonym.

Mexico City, Distrito Federal, VIII, 22, 1929, 1 ♀, [Hebard Cln.]. Jojutla, Morelos, V, 1929, (J. J. White), 1 ♀, [Hebard Cln.]. Santa Lucrecia, Vera Cruz, X, 1922, (J. J. White), 1 ♀, [Hebard Cln.]. Almoloyas, Oaxaca, XI, 1922, (J. J. White), 1 ♀, [Hebard Cln.]. Palomares, Oaxaca, VII, 1909, 1 ♀, [A. M. N. H.]. La Zacualpa, Chiapas, VIII, 1909, 1 ♀, [A. M. N. H.].

**Schistocerca vitticeps luridescens** (Walker)

This insect is extremely close to *vitticeps carinata*, being usually a much more mottled insect with wings more deeply tinged with yellow. It may eventually prove to be a synonym. From paratypes of Scudder's *aurantia* and *mellea* we are satisfied that those names are both synonyms.

A pair from Vera Cruz recorded by Bruner as *mellea*, a paratype of *aurantia* from Realejo, Nicaragua and the following series are before us.

Merida, Yucatan, (G. F. Gaumer), 18 ♂, 21 ♀, [Hebard Cln.]. Chichen Itza, Yucatan, (E. Thompson), 1 ♂, [Field Mus.].

**Schistocerca camerata** Scudder

Tepic, Nayarit, (Eisen and Vaslit), 3 ♂, 12 ♀, [Cal. Acad. and Hebard Cln.].

The caudal tibiae are vinaceous drab to russet vinaceous in this series.

It is possible that this is *Acridium strenuum* Walker, described from Oaxaca. Comparison of material with that type is necessary and the synonymizing of *camerata* is otherwise unwarranted.

Two males from Guadalajara, Jalisco, in the Academy collection, were recorded as *obscura* by Rehn in 1904.

**Schistocerca vaga vaga** Scudder

Rodriguez, Nuero Leon, VI, 6, 1931, (A. Dampf), 1 ♀, [Hebard Cln.]. Monterrey, Nuevo Leon, X, 31, 1909, (J. Friesser), 1 ♂, 2 ♀, [Field Mus.]; XI, 24, 1909, (F. C. Bishopp), 2 ♂, [U. S. N. M.]. Jaral, Coahuila, XI, 1 to 3, 1909, (J. Firesser), 1 ♂, [Field Mus.]. Lerdo, Durango, XI, 1887, (L. Bruner), 1 ♂, 1 ♀, [Hebard Cln.]. Copete Mine, thirty miles East of Carbo, Sonora, (F. C. Nicholas), 1 ♂, 3 ♀, [A. M. N. H.]. San José del Cabo, Baja California, 6 ♂, 17 ♀, [Cal. Acad. and Hebard Cln.]. Cape San Lucas, Baja California, 2000 feet, (G. Eisen), 1 ♀, [Hebard Cln.]. Aguascalientes, Aguascalientes, XI, 1887, (L. Bruner), 4 ♂, 1 ♀, [Hebard Cln.]. Queretaro, Queretaro, XI, 1887, (L. Bruner), 2 ♂, [Hebard Cln.]. Guadalajara, Jalisco, (D. L. Crawford), 3 ♂, 1 ♀, [A. N. S. P.]. Autla, Jalisco, 3 ♂, [Mex. Govt.]. Zapotlanejo, Jalisco, VII, 31, 1903, (J. F. McClendon), 3 ♀, [Hebard Cln.]. Tlalpam, Distrito Federal, XI, 1887, (L. Bruner), 1 ♂, [Hebard Cln.]. Distrito Federal, VII, 1910, 1 ♂ (small), [Mex. Govt.]. Guadalupe, Distrito Federal, VIII, 31, 1903, (W. L. Tower), 2 ♂, 1 ♀, [A. M. N. H.]. Santa Fé, Distrito Federal, VIII, 29, 1903, (W. L. Tower), 1 ♀, [A. M. N. H.]. Orizaba, Vera Cruz, IX, 1, 1903, (W. L. Tower), 1 ♀, [A. M. N. H.]. Cuernavaca, Morelos, (O. W. Barrett), 1 ♀, [Hebard Cln.]. San José, Morelos, (O. W. Barrett), 1 ♀, [Hebard Cln.]. Rio Cocula, Guerrero, (C. C. Deam), 2 ♂, 1 ♀, [Hebard Cln.]. Tonala, Chiapas, 1909, (A. Petrunkevitch), 1 ♂, [A. M. N. H.]. La Zacualpa, VII, 1909, (A. Petrunkevitch), 1 ♀, [A. M. N. H.].

The female from Rio Cocula, Guerrero which Rehn recorded as *pyramidata* in 1900 and as *camerata* in 1901 represents this species.

**Schistocerca pallens** (Thunberg)

Tampico, Tamaulipas, XII, 1906, 1 ♂, 1 ♀, [Hebard Cln.]. Motzorongo, Vera Cruz, (L. Bruner), 1 ♂, [Hebard Cln.]. Jojutla, Morelos, V and VI, 1929, (J. J. White), 2 ♀, [Hebard Cln.]. Zapotlanejo, Jalisco, VII, 31, 1903, (J. C. McClendon), 1 ♂, [Hebard Cln.]. Merida, Yucatan, (G. F. Gaumer), 1 ♂, [Hebard Cln.].

These specimens represent the large, elongate, distinctively longitudinally striped condition of *pallens*, known to us additionally only from material from the Greater Antilles, Jalisco and Sinaloa.

**Schistocerca paranensis** (Burmeister)

The species was recorded from Jalisco as *peregrina* by Bruner in 1908. It is the scourge of tropical America. Several important papers dealing with *paranensis* and its ravages in tropical Mexico have been published by Dampf.

Cordoba, Vera Cruz, X, 12 and XI, 6, 1924, (A. Dampf), 9 ♂, 3 ♀, [Hebard Cln.]. Guadalajara, Jalisco, (D. L. Crawford), 2 ♂, 1 ♀, [A. N. S. P.]. Zapotlanejo, Jalisco, VII, 31, 1903, (J. C. McClendon), 5 ♂, [Hebard Cln.]. Teapa, Tabasco, II, (H. H. Smith), 1 ♀, [Hebard Cln.]. Tacotalpa, Tabasco, II, 1923, 3 large juv. ♂, 1 large juv. ♀, [Mex. Govt.].

**Schistocerca americana americana** (Drury)

From the descriptions we are now convinced that Walker's *Acridium vicarium* described from Orizaba and Oaxaca and *piceifrons* described from Orizaba are synonyms; probably of this race but possibly of the sedentary phase of *Schistocerca paranensis*. Dampf has suggested that *americana* may represent that phase.[26] We believe that much comparison of material and breeding experiments must be conducted before this can be decided. We do know, however, that in the United States and West Indies only *americana* occurs and in the latter regions breaks into several distinct races. This suggests that a distinct species is represented.

In Mexico both *paranensis* and *americana* apparently occur typically. If a sedentary phase of the former is there present, differing much as does *americana* from the typical condition of *paranensis*, we have been unable to distinguish it from *americana americana*.[27] In South America *paranensis* occurs typically and also a sedentary phase, very much less frequently encountered, which is generally very similar to typical *americana*.

Ensenada, Baja California, VII, 2 to 5, 1905, (F. X. Williams), 1 ♀ (large, pale), [Hebard Cln.]. Tepic, Nayarit, 1 ♂ (large, richly colored), [Cal. Acad.]. Vera Cruz, Vera Cruz, (T. Heyde),

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[26] Internat. Ent.-Kongress, Zurich, 1925, II, p. 285, (1926).

[27] See Hebard, Trans. Amer. Ent. Soc., LI, p. 286, (1925).

2 ♂, 2 ♀, recorded by Bruner in 1908 as *piceifrons*, [Hebard Cln.]. Cordoba, Vera Cruz, X, 1, 1924, (A. Dampf), 1 ♂ (medium, richly colored), [Hebard Cln.]. Temax, Yucatan, (G. F. Gaumer), 1 ♂, [Hebard Cln.]. Merida, Yucatan, (G. F. Gaumer), 3 ♂, 4 ♀, [Hebard Cln.]. Cuernavaca, Morelos, X, 19, 1902, 1 ♀, [Cal. Acad.]. Tapachula, Chiapas, (A. Dampf), taken XII, 1924, bred adult VI, 1925, 1 ♂, 1 ♀ (small, richly colored), [Hebard Cln.].

**Schistocerca shoshone** (Thomas)

1899. *Schistocerca obliquata* Scudder, Proc. Am. Acad. Arts and Sci., p. 470.

The male type and female allotype of *obliquata*, from San José del Cabo, Baja California, described by Scudder in 1899, are dried alcoholic specimens in the author's collection. They definitely prove the present synonymy.

Seven males and thirteen females from the same series are before us, five males and four females showing weakly a pale medio-longitudinal dorsal stripe. Though Bruner correctly labelled material from this series, he labelled and recorded in 1908 other of the specimens as the synonym *obliquata*.

Escuinapa, Sinaloa, (J. H. Batty), 5 ♂, 2 ♀ (no dorsal stripe), [A. M. N. H.]. Cape San Lucas, Baja California, 2000 feet, (G. Eisen), 3 ♀ (two with pale medio-longitudinal dorsal stripe), [Cal. Acad.].

**Schistocerca obscura** (Fabricius)

Victoria, Tamaulipas, (O. W. Barrett), 1 ♂ (dorsal bands of caudal femora heavy and conspicuous), [Hebard Cln.]. Vera Cruz, Vera Cruz, (T. Heyde), 2 ♀, recorded by Scudder in 1899, (dorsal bands of caudal femora weak), [Hebard Cln.].

Previous records of this species from northwestern Mexico are, we believe, in all cases based on material of other species.

**Schistocerca insignis** new species (Pl. XVIII, figs. 2 and 3)

This large and striking species has liver colored tegmina as in *obscura*, but the dark lateral lobes of the pronotum have a very striking yellow area and the caudal femora are quite differently colored. The heavier male cerci also have the disto-ventral portion distinctly more produced so that the distal margin is more strongly oblique.

The females before us were referred to *lineata* by Rehn in 1904.

*Type.*—♂; Guadalajara, Jalisco, Mexico. September 19, 1903. (J. F. McClendon.) [Acad. Nat. Sci. Phila., Type No. 5509.]

Size large, form robust for the genus. Interspace between eyes scarcely more than width of frontal costa between antennae; fastigium moderately impressed and declivent; frontal costa distinctly widest between antennae, its surface above median ocellus almost deplanate and impresso-punctate, below broadly and deeply sulcate. Antennae very elongate, as long as caudal femur. Pronotum with surface showing a coarse network of rugae; median carina coarse and distinct throughout, but deeply cut by the coarse transverse sulci; disk rounded cephalad, flattened caudad; prozona very slightly longer than metazona; caudal margin of disk slightly more than rectangulate but with apex bluntly rounded. Tegmina and wings fully developed. Prosternal spine cylindrical, moderately elongate, with rounded apex; slanting weakly caudad and not constricted toward base. Interspace between mesosternal lobes widening considerably cephalad. Cerci large, lamellate, widening distad, with rounded disto-ventral angle considerably the most produced, distal margin consequently oblique. Subgenital plate crushed, apparently much as in *obscura* with a deep and narrow median cleft. Caudal femora elongate and comparatively slender. Caudal tibiae with (eleven, curved) internal spines longer than the (eight and nine) external spines.

*Allotype.*—♀; same data as type. [Acad. Nat. Sci. Phila.]

Very much larger and more robust than male. Interocular space wider, one and a quarter times width of frontal costa between antennae. Prozona slightly longer than metazona. Transverse sulci of pronotum even more conspicuous.

Coloration and color pattern of high diagnostic value, sexes very similar in these features. Face ivy green, genae and occiput decidedly darker except for a broad dorsal longitudinal band of light cadmium (a bright orange yellow) continued on pronotum and tegmina to near their apices, and vertical bars of the same before and behind the eyes, the latter the least conspicuous. Pronotum elsewhere, like the occiput, olivaceous black except for a broad horizontal area of light cadmium on the lateral lobes meso-ventrad which does not reach the cephalic margin and stops at the principal sulcus and minute flecks of light cadmium which are particularly numerous on the metazona. Tegmina elsewhere blackish liver brown paling to cinnamon brown distad; in male more olivaceous proximad and paler distad. Cephalic and median limbs deep olive. Caudal femora dorsad vetiver green (light grayish green) with a mere trace of transverse proximal but distinct meso-distal darkening, the genicular areas blackish but with their lobes mustard yellow; external pagina dorsad dull citrine with dorsal and ventral margins often slightly darker, ventrad cream color with carinae more yellow, distad before genicular areas vetiver green. Caudal tibiae and tarsi shining black, the spines lemon yellow mesad.

The measurements of the smallest of the two female paratypes, bearing the same data, precede those of the allotype. Length of body ♂ 40, ♀ 60 and 61.3; length of pronotum ♂ 8.7, ♂ 11.3 and 13.1; length of metanotum ♂ 4.25, ♀ 5.8 and 6.9; caudal width of pronotal disk ♂ 5.2, ♀ 7.3 and 7.8; length of tegmen ♂ 37.4, ♀ 50.8 and 55.7; length of caudal femur ♂ 22.2, ♀ 27.8 and 31.8 mm.

**Schistocerca albolineata** (Thomas)

This striking species is readily recognizable from the original description, though the accompanying figure is poor. Scudder misidentified material of other species as this insect and in consequence erected the synonym *mexicana*, based on a male from Sinaloa in the Museum of Comparative Zoology.

Copete Mine, thirty miles East of Carbo, Sonora, (F. C. Nicholas), 5 ♂, 11 ♀, [A. M. N. H. and Hebard Cln.].

This is one of the most distinctive as well as most brilliantly colored species of the genus. It is peculiar to the "arboreal desert" region and will, we believe, be found to live largely if not wholly on a certain species of desert shrub.

**Pedies virescens** Saussure

We have examined the types in the Geneva Museum, certainly mislabelled "Cordova t[ierra] c[aliente]" as the insect is plainly a type developed at very high elevations only. The male genitalia are exactly as in material before us from Orizaba and *Platyphyma mexicana* Brunner is based on a female from that mountain, taken at the foot of the snows. There is also no question but that both names are based on a single species; Saussure's is dated April, 1861 and Brunner's paper was submitted at a meeting on April 9, 1861.

The earliest genotypic fixation, of *mexicanus* for *Pedies*, was made, not by Kirby as we stated in 1917, but by Rehn in 1909.

**Pedies variabilis** (Scudder)

Irapuato, Guanajuato, XI, 11, 1927, (on swamp plants), 3 ♂, 1 ♀, [Mex. Govt. and Hebard Cln.]. Guajimaloa, Distrito Federal, 8500 feet, IX, 1, 1925, (H. B. Baker; near scrub oaks and mayaguez in arroyo, 1 ♂, [Univ. of Pa.]. Distrito Federal, VII, 1910, 1 ♀, [Mex. Govt.].

The male is brighter than those from Tlalpam before us, the green portions lighter and more yellow, the bright red of the ventral surfaces of the caudal femora suffusing their external surfaces ventrad as well.

**Cephalotettix pilosus** (Stål)

Cordoba, Vera Cruz, 850 meters, IX, 7, 1926, (H. B. Baker; in weeds and brush on slopes of limestone hills, Las Tortolas), 1 ♂, [Univ. of Pa.].

**Phaedrotettix gracilis** (Bruner)

Tampico, Tamaulipas, XII, 1906, 1 ♀ (taken with type), [Hebard Cln.].

**Phaedrotettix bistrigatus** (Scudder)

El Mante, Tamaulipas, 80 meters, VI, 2, 1931, (A. Dampf), 1 ♂, 1 ♀ (green phase, stripes very weak), [Hebard Cln.]. Valles, San Luis Potosi, I, 6, 1907, 1 ♂, [Hebard Cln.].

We must modify our 1917 key, for though furcula are normally practically obsolete in *bistrigatus*, very weak convexities of the tergite mesad are indicated in the El Mante male.

**Phaedrotettix valgus** (Scudder)

El Mante, Tamaulipas, 80 meters, VI, 2, 1931, (A. Dampf), 3 ♂, [Mex. Govt. and Hebard Cln.].

In 1917 we discussed the genus *Phaedrotettix* Scudder and gave a key for the species then known.[28] That key must now be enlarged to include the two new species which here follow.

To section AA. Tegmina longer, elongate ovate. Male supra-anal plate simple, (broadly) shield-shaped. Male cerci broad.
  B. Cerci not bent inward.
    C. Antennae not annulate. Cerci broad, apex situated dorsad. Furcula very broad and extremely shallow plates, with distal margin straight. General coloration green, locally washed with red; color pattern not complex. Subgenital plate with surface curved, this strongest distad. Tamaulipas............ ..................*litus* Hebard
    CC. Antennae strikingly annulate. Cerci narrower, apex situated ventrad. Furcula broad, with distal margin

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[28] Proc. Acad. Nat. Sci. Phila., 1917, p. 255.

straight. Coloration deep green, dark brown and yellow buff in sharp contrast. Subgenital plate with large weak convexity of surface meso-distad. Vera Cruz.
*annulicornis* new species

And to new section AAA. Tegmina broad ovate, the distal margin showing concavity. (Antennae not annulate. Cerci simpler and more slender than in *annulicornis* but of similar type, broader only than in *gracilis* and *bistrigata*. Furcula represented by minute, sharply rounded projections which are longer than broad. General color deep green and dark brown, and in male yellow buff with paired areas of rich coral red on four proximal abdominal tergites. Subgenital plate small and evenly convex. Puebla... ...*coloratus* new species

**Phaedrotettix annulicornis** new species (Pl. XXI, fig. 6)

In general appearance this handsome species agrees most with *gracilis*, differing widely in the extent of the green and richer buff markings and in the elongate and very strikingly annulate antennae.

The larger size, broader tegmina and genitalia further distinguish it. The male furcula and subgenital plate are nearest *valgus* but the cerci nearest *coloratus*.

*Type*.—♂; Cordoba, Vera Cruz, Mexico. Elevation 750 meters. September 9, 1926. (H. B. Baker; near Potrero.) [Acad. Nat. Sci. Phila., Type No. 5504.]

Size and form medium for group, much as in *bistrigatus* but definition between disk and lateral lobes of pronotum distinct though not conspicuous and in this agreeing best with *gracilis* and *coloratus*. Surface generally smooth, supplied with microscopic hairs, these particularly numerous on the caudal tibiae. Head with interocular space very narrow, narrow sulcus of vertex distinct; vertex short, transverse, decidedly declivent; face evenly retreating; frontal costa weakly sulcate only to just above antennal sockets where it is narrowest; supplementary facial carinae distinct as in *gracilis*, not as decided as in *litus*. Eyes strongly protuberant, more so than in any other species, distinctly longer than genae. Antennae filiform, distinctly over twice as long as pronotum, as long as caudal femur. Pronotum with weak and coarse but distinct lateral carinae, parallel to first sulcus, then diverging caudad; medio-longitudinal carina suggested only before and after sulci; transverse sulci fine; surface rugulose and impresso-punctulate particularly on metazona, lateral lobes more glabrous; caudal margin of metazona very broadly concave. Tegmina lateral, elongate-ovate, over twice as long as broad, widest meso-distad, apex evenly rounded, convexity strongest dorso-caudad (as in *litus*, not ventro-caudad as we gave for that species in error but figured correctly); veins distinct, forming an even network. Prosternal process well developed, very slenderly conical. Mesosternal space longer than wide. Furcula, cerci and subgenital plate as given in key. Supra-anal plate large, simple, shield-shaped, considerably more elongate than in *gracilis*.

Dorsal surface of head and pronotum and apex of abdomen dark greenish olive, limbs and ventral surface paler. Tegmina chestnut brown. Antennae black with broad buff annuli. Face and genae buffy washed with olive. A broad postocular band of blackish brown occupies the dorsal portion of the pronotal lateral lobes, the pleura and a broad section of the sides of the abdomen to near apex; the lateral lobes with ventral portion (its dorsal margin convex dorsad as in *gracilis*) and an oblique stripe on pleura of buff yellow, the abdomen with a broad medio-longitudinal dorsal stripe to near distal portion of naples yellow. Caudal femora and tibiae olive with no bands but suffused distad.

The female will probably be found to be much less brilliantly colored, as is the case with *coloratus*.

The unique male type measures; length of body 18 (abdomen retracted), length of pronotum 4.8, caudal width of pronotum 4, length of tegmen 3.8, width of tegmen 1.7, length of caudal femur 11.8 mm.

**Phaedrotettix coloratus** new species (Pl. XXI, fig. 7)

Resembling *annulicornis* more nearly in general contour, this striking insect is quickly distinguished from all previously known forms of the genus by the broad tegminal pads, very striking coloration of the dorsal surface of the male abdomen and minute, slender cerci.

*Type.*—♂; Necaxa, Puebla, Mexico. Elevation 925 meters. July 28, 1926. (H. B. Baker; in banana patch.) [Acad. Nat. Sci. Phila., Type No. 5505.]

Size smaller, form very similar but eyes less prominent and lateral margins of pronotal disk diverging more gently and evenly caudad throughout than in *annulicornis*. Surface and head very similar but eyes less prominent. Antennae filiform, elongate, about twice pronotal length. Pronotum with median carina very faint cephalad on prozona, weak on metazona, caudal margin of the latter showing very faint concavity. Tegmina lateral, broad, distinctly less than twice as long as broad, truncate distad with distal margin shallowly but appreciably obtuse-angulate emarginate. Prosternal process well developed, very slenderly conical. Genitalia as given in key. Supra-anal plate rather narrowly shield-shaped, with two longitudinal ridges, lateral margins thickened proximad and apex with two short, parallel, well developed, longitudinal carinae.

*Allotype.*— ♀ ; same data as type. [Acad. Nat. Sci. Phila.].

Generally similar to male except as follows. Much larger and broader. Eyes decidedly less prominent. Antennae decidedly shorter, only slightly longer than combined length of head and pronotum. Ovipositor valves elongate, dorsal pair with dorso-external margins rather strongly toothed, apical tooth elongate and broadly curved dorsad.

Male. General coloration of dorsum dark brown becoming greenish on metazona, first four abdominal tergites with dorsal surface almost filled with paired areas of rich coral red, a median line and narrow margins of tergites blackish. Vertex lighter brown. Antennae black, paling proximad. A broad shining blackish green postocular bar filling dorsal portions of lateral lobes of pronotum and continued on sides of four proximal abdominal tergites. Face, genae, ventral portions of lateral lobes (with dorsal margin irregular) and adjacent area of pleura (but no oblique stripe) buff yellow, showing a very faint greenish tinge in the type. Tegmina mars brown. Ventral surface greenish yellow deepening to cosse green on subgenital plate. Dorsal portion of apex of abdomen dark buffy brown. Limbs grass green; caudal femora with dorso-external margin (except proximad and before genicular area) and all genicular area warm sepia, their ventral surfaces yellow green. Caudal tibiae slightly paler grass green, with apices and all but base of last tarsal joint brown.

Female. Generally warm sepia, slightly darker on dorsal portions of pronotal lateral lobes and shining blackish proximo-laterad on abdomen. Ventral portions of lateral lobes very slightly paler in area which in male is very pale. Caudal femora, except dorsal surface and genicular areas deep cedar green. Caudal tibiae as in male. Abdomen without striking dorsal markings.

Though the female sex of *litus* somewhat suggests the genus *Podisma*, the appearance of this sex of *coloratus* is more like that of the genus *Conalcaea*.

The measurements of the type are followed by those of the smallest paratype. Length of body ♂ 17.2 and 14.3 (abdomen retracted in both), ♀ 23.2; length of pronotum ♂ 5 and 4.2, ♀ 6.8; caudal width of pronotum ♂ 4, and 3.6, ♀ 6; length of tegmen ♂ 3.3 and 2.7, ♀ 4.2; width of tegmen ♂ 2.2 and 1.7, ♀ 2.8; length of caudal femur ♂ 11.8 and 10, ♀ 14.1 mm.

*Specimens Examined.*—4; 3 males and 1 female.

Necaxa, Puebla, 925 to 1400 meters, VII, 19 to 27, 1926, (H. B. Baker; in banana patch and on grassy mountainside), 3 ♂, 1 ♀, *type, allotype, paratypes,* [A. N. S. P. and Hebard Cln.].

**Aidemona azteca** (Saussure)

El Mante, Tamaulipas, VI, 2, 1931, (A. Dampf), 1 ♂, [Hebard Cln.]. Valles, San Luis Potosi, I, 6, 1907 and I, 18, 1909, (in corn field), 2 ♂, 1 ♀, [Ill. State Lab.]. Ixtlan, Nayarit, (Gonzalez), 1 ♀, [Mex. Govt.]. Coatepec, Vera Cruz, V and VI, 1922, (Conradt), 4 ♂, 10 ♀, [Mex. Govt.]. Tlalpam, Distrito Federal, X, 7, 1923, (border of corn field), 1 juv., [Hebard Cln.]. Necaxa, Puebla, 925 to 1400 meters, VII, 27 and 28, 1926, (H. B. Baker; banana patch below and mountainside above), 3 ♂, [Univ. of Pa.]. Iguala, Guerrero, 1929, (H. Kruger), 3 juv. ♂, 3 juv. ♀ (four large, one small), [A. N. S. P.].

**Paraidemona mimica** Scudder

Matamoros, Tamaulipas, VI, 30, 1908, 1 ♂ (very small), [Hebard Cln.]. Tampico, Tamaulipas, XII, 1906, 3 ♂, 4 ♀, [Ill. State. Lab. and Hebard Cln.]. Rodriguez, Nuevo Leon, VI, 6, 1931, (A. Dampf; in alfalfa), 1 ♀ (very large and brilliantly colored), [Hebard Cln.].

**Campylacantha olivacea similis** Scudder

As we noted in 1917, *lamprotata* Rehn and Hebard differs only in being less robust with coloration lighter and more brilliant. Since then further investigation has shown that *lamprotata* represents merely a race of *olivacea.* Though more material from northern Mexico is needed, we are convinced that such is also true of *similis,* to which *lamprotata* is very close.

**Hesperotettix viridis meridionalis** Scudder

Since 1917 our investigations of this species have shown that in the United States it breaks into numerous races. Though study of material from Texas and northeastern Mexico is needed, we are now satisfied that *meridionalis* represents certainly no more than a race of *viridis,* possibly merely an optimum development in both size and brilliancy of coloration of *viridis viridis,* which was described from the Great Plains.

**Melanoplus plebejus** (Stål)

Tampico, Tamaulipas, XII, 26, 1908 and XII, 1906, 2 ♂, [Hebard Cln.].

The apices of the cerci are very slightly narrower than in Texan series before us, this possibly indicating incipient racial differentiation.

The dorsal bands of the caudal femora are weak in one, obsolete in the other. These bands are heavy in the majority of the Texan series, but occasionally are as in the present material.

Size variation is great, plainly dependent on local environmental conditions rather than geographic distribution.

**Melanoplus bakeri**[29] new species (Pl. XXI, fig. 8)

This diminutive species is nearest *scitulus* Scudder, of which a paratypic male is in the author's collection. It agrees in general form, though smaller and more slender, in the distinctive prosternal spine, type of tegmina which are, however, more ample and general coloration.

It is widely distinct from any previously known species of *Melanoplus* in the combination of the characters of the male genitalia and particularly in the form of the cerci.

*Type.*—♂; Guajimaloa, Distrito Federal, Mexico. Elevation 8500 feet. September 1, 1926. (H. B. Baker; in grass along arroyo near scrub oaks and mayaguez.) [Acad. Nat. Sci. Phila., Type No. 5506.]

Size very small, form slender for the genus. Interocular space very slightly narrower than length of first antennal joint. Vertex and frontal costa as in *scitulus*, the latter narrowing dorsad and showing weak concavity only below median ocellus. Eyes large, but little protuberant, decidedly longer than infra-ocular portion of genae. Pronotum elongate, lateral margins evenly and weakly diverging caudad, medio-longitudinal carina strong throughout, prozona decidedly longer than wide, caudal margin of disk very feebly convex. Prosternal process large, broad, with cephalic face weakly concave and distal margin broadly convex-truncate. Interspace between mesosternal lobes nearly twice as long as least width. Tegmina broad ovate, decidedly overlapping, lateral field rounding broadly distad to dorsal field, which is more produced and more strongly rounded distad. Furcula large; represented by two elongate, tapering, feebly divergent fingers. Supra-anal plate with lateral margins slightly emarginate at cerci, rounding distad into the broad and truncate apex. Cerci small; base very large and considerably broader than long, thence with a small finger of almost equal length projecting from ventral angle and curved sharply inward with distal two-thirds very faintly spatulate and apex sharply rounded. Subgenital plate small and short, its apex broadly truncate.

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[29] Named in honor of Dr. H. B. Baker, who has many times aided us in our studies on the Orthoptera.

Dorsal surface deep prouts brown including dorsal fields of tegmina. Face and lateral lobes of pronotum paler, the latter with a broad shining band of blackish brown continued only to principal sulcus but reappearing on pleura (which have a narrow oblique streak of buff), tegmina (where it becomes weaker distad) and proximad on abdomen. Ventral surface antimony yellow. Cephalic and median limbs dresden brown paling ventrad. Caudal femora dresden brown becoming yellow ocher ventrad and genicular areas blackish. Caudal tibiae marine (a very deep) blue, spines black with white bases, tarsi buffy brown.

Length of body (apex of abdomen recurved) 12.3, length of pronotum 3.8, total caudal width of pronotum 3, length of tegmen 3.7, width of tegmen 2.2, length of caudal femur 8 mm.

A paratype, bearing the same data as the type, is in the author's collection.

**Melanoplus thomasi** Scudder

Sonora, 1 ♂, 3 ♀, [A. M. N. H.].

**Melanoplus differentialis** (Thomas)

Coatepec, Vera Cruz, 1 ♂, [Mex. Govt.].

**Melanoplus sumichrasti** (Saussure)

Necaxa, Puebla, 925 to 1370 meters, VII, 28, 1926, (H B. Baker; in meadow and banana patch), 2 ♂, [Univ. of Pa. and A. N. S. P.].

**Melanoplus gladstoni** Scudder

Autla, Jalisco, 1 ♀, [Mex. Govt.]. Texcoco, Mexico, 1 ♂, [Mex. Govt.]. Distrito Federal, 1 ♂, 1 ♀, [Mex. Govt.].

These are large and robust examples such as have been generally recognized from Mexico as *corpulentus*. In 1929 we established the synonymy of that name.[30]

**Melanoplus regalis** (Dodge)

In 1929 we also placed *picturatus* Bruner, described from Colonia Garcia, Chihuahua, as a synonym of *regalis*. That name was based on a very striking optimum condition also present in southeastern Arizona.

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[30] Proc. Acad. Nat. Sci. Phila., LXXXI, p. 380.

**Melanoplus femur-rubrum femur-rubrum** (DeGeer)

El Mante, Tamaulipas, V, 2, 1931, (A. Dampf), 2 ♂, [Mex. Govt.]. Valles, San Luis Potosi, I, 6, 1907, 1 ♂, [Ill. State. Lab.]. Coscomatopec, Vera Cruz, XI, 30, 1924, (fallow land), 1 ♂, 1 ♀, [Mex. Govt.]. Texcoco, Mexico, 1 ♀, [Mex. Govt.]. Autla, Jalisco, 1 ♂, [Mex. Govt.].

**Melanoplus lakinus** (Scudder)

This species was recorded as *marculentus* by Rehn in 1904 and by Bruner in 1908, a name synonymized by Hebard in 1917.

Torreon, Coahuila, X, 30, 1909, (J. Friesser), 1 ♂, 1 ♀, (male brachypterous, female macropterous), [Field Mus.]. Jiminez, Chihuahua, (Rocha), 2 ♂, (one brachypterous, one macropterous), [Mex. Govt.]. San Juan Teotihuacan, Distrito Federal, 7500 feet, IX, 5, 1926, (H. B. Baker; high plains with *Yucca* and *Opuntia*), 1 ♂, [Univ. of Pa.].

The last specimen is small but unusually brilliantly colored, the green on the mesonotum, yellow on head and pronotal lateral lobes and red of the ventral surfaces of the caudal femora being very conspicuous.

**Melanoplus occidentalis occidentalis** (Thomas)

This insect was reported from Zacatecas by Bruner in 1908 as *flabellifer*, a name placed by us as a synonym in 1925.

**Melanoplus mexicanus mexicanus** (Saussure)

Cuernavaca, Morelos, VIII, 1911 and XII, 1910, 1 ♂, 1 ♀, (caudal tibiae glaucous), [Mex. Govt.]. Los Reyes, Lake Texcoco, Mexico, X, 21, 1923, (sterile salt steppe), 1 ♂, 1 ♀, [Mex. Govt.]. Chapingo, Distrito Federal, III, 31, 1923, (in alfalfa), 1 ♀, [Mex. Govt.]. Mexico City, Distrito Federal, VI, 19, 1924, (along water trench in *Urtica*), 1 ♀, [Mex. Govt.]. Distrito Federal, 3 ♀, (caudal tibiae rich pink), [Mex. Govt.]; VIII, 1929, (J. J. White), 2 ♂, (caudal tibiae deep glaucous in one, rich pink in one), [Hebard Cln.]. Autla, Jalisco, 1 ♂, 2 ♀, [Mex. Govt.]. La Barca, Jalisco, V, 1920, (Conradt), 1 ♂, 1 ♀, (caudal tibiae deep pink), [Mex. Govt.]. San Lucrecia, Vera Cruz, X, 1922, (J. J. White), 1 ♀, (caudal tibiae glaucous), [Hebard Cln.]. Ocotlan, Oaxaca, III, 5 to 24, 1922, (J. J. White), 4 ♂, 1 ♀, (caudal tibiae glaucous), [Hebard Cln.].

A pair were recorded from Tacubaya, Distrito Federal, by Rehn, the male as *spretis* in 1900, the female as *arizonae* in 1901. The insect was reported by that author as the synonym *atlanis* from Patzcuaro, Michoacan, in 1902 and as *atlanis* and *spretus* from Guadalajara, Jalisco, in 1904.

**Melanoplus arizonae** Scudder

In 1929 we placed Scudder's *palmeri* as a synonym. The species has been recorded from Mexico under that name a number of times.

**Melanoplus flavidus elongatus** Scudder

Tampico, Tamaulipas, XII, 1906, 2 ♂, 1 ♀, [Ill. State Lab. and Hebard Cln.].

This insect was reduced to racial status by the author in 1925. It had been previously reported from Mexico both as *flavidus* and as *elongatus*.

**Phoetaliotes nebrascensis** (Thomas)

San Juan Teotihuacan, Distrito Federal, 7500 feet, IX, 5, 1926, (H. B. Baker; on high plains with *Yucca* and *Opuntia*), 1 ♂, (brachypterous), [Univ. of Pa.]. Vera Cruz, 2 ♀, (exceptionally brilliantly colored), [Mex. Govt. and Hebard Cln.].

### NECAXA new genus

This remarkable new genus, including the single species, as genotype, *micans*, would at first glance appear to be related to *Lithoscirtus* Rehn and its allies. Closer examination shows it to be actually very widely separated and a distinctive member of the Melanopli. The similarity lies mainly in the fact that both genera in question show high specialization for living in foliage and vines. Though differing very widely in appearance and in other structural features, the highly specialized subgenital plate and preceding sternite of the male show nearest resemblance to those structures in the Appalachian *Melanoplus decoratus* Morse.

Though the interspace between the mesosternal lobes is much longer than broad in the male, we do not believe that this feature has the significance attributed to it by Scudder. In *Necaxa* there are more features of agreement with *Podisma* Latreille than with *Melanoplus* Stål, but those genera are much more closely related to each other. In *Necaxa* the vertex is slightly more produced, the rounding of the fastigio-facial angle is slightly stronger and the facial profile, definitely retreating, is straight and shows a mere trace of concavity instead of being faintly convex (normal) or strongly so (rare) as is the case in *Podisma* and *Melanoplus*. The genotype of *Necaxa* is also a more graceful species than any of those genera known, with width across eyes more definitely greater than least total pronotal width in the male.

Other characters of *Necaxa* are: Size medium small, form very slender for the group. Antennae slightly longer than caudal femora in male. Eyes rather large, not strikingly protuberant but conspicuous in male, due to slenderness of the body. Pronotum simple, showing no constriction, prozona considerably over twice as long as metazona; caudal margin of disk distinctly emarginate in male, faintly so in female.[31] Tegmina represented by very small, narrow, lateral pads, which conceal the foramina. Apex of male abdomen clavate, enlarged ventral section formed by the subgenital plate and large preceding sternite, the former with lateral dorsal portions convex projecting and also provided with a very large subapical tubercle. Male cerci simple, with apices directed inward at a rightangle. Ovipositor normal, with sharp distal extremities broadly curved.

It is difficult to make comparisons with *Melanoplus*, as Scudder's characterization of that genus is insufficient and at fault in many features shown by species there assigned at present. That genus is a vast aggregation of species, forming many distinctive groups. Subdivision into a number of subgenera or even genera will probably occur.

**Necaxa micans** new species (Pl. XVIII, figs. 5 and 6)

Though considerably resembling the Costa Rican *Lithoscirtus daedalus* Rehn, anything more than a casual glance reveals wide differences not only in structure but also in color.

*Type.*—♂; Necaxa, Puebla, Mexico. Elevation 1400 meters. July 27, 1926. (H. B. Baker; grassy mountainside.) [Acad. Nat. Sci. Phila., Type No. 5510.]

The following features are additional to those already given. Form very slender for the Melanopli; surface shining, rather hirsute. Interocular space very narrow. Fastigium moderately declivent, moderately impressed, projecting beyond lateral ocelli about one half its diameter between them. Frontal costa slightly expanding between antennae, flat with scattered impressed punctae from median ocellus to clypeus and shallowly concave between the lateral carinae; carina of face and subocular sulcus as prominent as those carinae. Pronotum with disk defined from lateral lobes by appreciable lateral carinae which are straight and very slightly divergent caudad; medio-longitudinal carina very weak, cut by all three delicate but distinct transverse sulci; caudal margin of disk broadly convex on each side, thus forming a median broadly obtuse-angulate emargination. Tegminal pads slender, length three times greatest width, gradually expanding to their rounded apices; venation prominent, longitudinal, fairly regular. Furcula represented by two, very small, adjacent, transversely rounded enlargements of the caudal margin of the tergite, each over twice as broad as long. Supra-anal plate triangular, surface with a broad shallow medio-longitudinal sulcus in proximal portion only; lateral margins convergent, very faintly convex, then very faintly concave, then straight and more strongly convergent to the rounded apex. Cerci with shaft vertically compressed, broadly incurved and decurved, tapering very gradually, with apical quarter suddenly bent inward at a rightangle to shaft and tapering to its rounded apex. Cephalic and median femora thickened and feebly bowed. Caudal femora medium; caudal tibiae as long with (normally) nine spines on each margin. Caudal metatarsus nearly three times as long as second joint, the latter somewhat longer than broad. Ultimate caudal tarsal joint with shaft almost as long as combined length of the two preceding joints. Arolium large.

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[31] Such emargination does not occur in *Melanoplus*, even in the species showing no greater tegminal development.

*Allotype.*—♀; same data as type but taken July 25. [Acad. Nat. Sci. Phila.]

Larger and considerably heavier than male, fusiform. Eyes less prominent, interocular space wider. Antennae decidedly shorter. Pronotum with caudal margin transverse showing very faintly lateral convexity and median emargination. Ovipositor valves normal, shoulders on ventral valves distinct, margins not toothed, apical fangs broadly curved.

Face and genae buffy suffused with brown. Antennae light brown becoming paler and greenish proximad. Lower portions of pronotal lateral lobes, a large area on succeeding plate of pleura and distal portion of last plate of pleura whitish. Occiput and postocular portions of genae, pronotum (except lower portions of lateral lobes), tegmina and all other portions of body shining blackish brown (except whitish markings on pleura described above and last two sternites of female which are greenish). Limbs yellowish green, the caudal femora with apices blackish brown and exposed surfaces slightly darkened, leaving a subapical paler annulus. Caudal tibiae glaucous with bases and apices briefly blackish, the former yellowish green for a brief interval beyond opposite the femoral annulus. Caudal tarsi blackish brown with metatarsus and last joint to near apex yellowish green.

The measurements of a male paratype in the author's collection, bearing the same data but taken at 925 meters on July 28 in a banana patch in a sheltered valley, follow those of the type. The decidedly larger size of this individual is probably ascribable to the more temperate environment in which it was taken. Length of body ♂ 11.7 (abdomen curled dorsad) and 15 (abdomen straight), ♀ 16.8; length of pronotum ♂ 2.8 and 3.2, ♀ 3.8; caudal width of pronotal disk ♂ 1.4 and 1.7, ♀ 2.9; exposed length of tegmen ♂ 1.8 and ♀ 2.8; length of caudal femur ♂ 8.2 and 9.8, ♀ 12.2 mm.

From the literature it is extremely difficult to separate the genus *Dactylotum* from the genera with which it has been associated. These and a previously unknown genus may be distinguished more readily by the following key.

A. Pronotum with weak transverse sulci, its caudal margin very little or not produced.
  B. Tegmina present. Male subgenital plate of normal length, moderately produced, its caudal margin not truncate. Male cerci evenly incurved. Lateral abdominal tympana present beneath tegmina.
    C. Tegmina represented by ovate pads more than half as broad as long. Male subgenital plate triangularly produced in ventral aspect, slightly blunt at apex. *Perixerus* Gerstaecker. Genotype.—*P. squamipennis* Gerst[32]
    CC. Tegmina represented by slender pads less than half as broad as long. Male subgenital plate with ventral margins curving to the rounded apex in ventral aspect[33] *Philocleon* Scudder. Genotype.—*P. nigrovittatus* (Stål)

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[32] Unfortunately we have not seen *Perixerus squamipennis* Gerstaecker, the genotype. We believe that both genus and species, *Hermistria pulchripes* Stål, will prove to be synonyms.

Both of the above and the other known species referred to *Perixerus* are known from females only except *Perixerus laevis* Rehn, and we are consequently able to give male generic characters only as shown by that species.

[33] This type of male subgenital plate is also shown by a number of species of the widely distinct genus *Oedaleonotus*.

BB. Tegmina absent. Male subgenital plate very narrow, extremely transverse and slightly broadest proximo-laterad, its distal margin transverse. Male cerci bent inward. Lateral abdominal tympana absent
*Zacatacris* new genus. Genotype.—*Z. scudderi* here named

AA. Pronotum with deep transverse sulci, its caudal margin produced. (Male cerci straight and subgenital plate with an acute meso-dorsal apex.)

B. Form medium. Pronotum with caudal margin rounded-angulate. Tegmina and wings fully developed
*Poecilotettix* Scudder

BB. Form robust. Pronotum with caudal margin convex. Tegmina represented by ovate pads. .*Dactylotum* Charpentier

**Perixerus laevis** Rehn

Agua Azul, Guadalajara, Jalisco, 5000 feet, IX, 12, 1903, (W. L. Tower), 1 ♀, [A. M. N. H.]. San Juan Teotihuacan, Distrito Federal, 7500 feet, IX, 5, 1925, (H. B. Baker; on high plains with Yucca and Opuntia), 1 ♂, [A. N. S. P.].

**Philocleon nigrovittatus** (Stål)

1897, (January). *Philocleon* [*nigrovittatus*] Scudder, Proc. Amer. Acad. Arts and Sci., XXXII, pp. 203 and 206. (Genus proposed, monotypic, *nigrovittatus* Stål designated.)

1897. *Philocleon nigrovittatus* Scudder (in part), Proc. U. S. N. M., XX, p. 398, pl. 27, fig. 9. [♂, Mexico.]

Under *scudderi* comparisons are made with the present species.

Guadalajara, Jalisco, IX, 14, 1903, (J. C. McClendon), 1 ♀, [A. N. S. P.]. Colima, X, 1927, 1 ♀, [Hebard Cln.]. Cuernavaca, Morelos, XI, 1905, (W. Schaus), 1 ♀, [U. S. N. M.]. Morelos, XI, (A. Koebele), 1 ♀, [Hebard Cln.].

Only the material from Morelos is typical with paler portions all yellowish. The other specimens are of conspicuously deeper form and have the ventral surface of the caudal femora (inside the ventro-external black band) light brick-red instead of dark brown. The Guadalajara female alone has the external half of the dorsal surface of the caudal femora and the median section of the pronotal metazona brick-red.

## ZACATACRIS new genus

This monotypic genus is based on the species here named *Zacatacris scudderi.*

It is very distinct from any of its allies and may be easily distinguished by the characters given in the key on page 292, though the species was confused by Scudder with *Philocleon nigrovittatus* (Stål).

The unusual median depth of females is only paralleled in *Philocleon* and in the very distinct genus *Phaulotettix* Scudder.

**Zacatacris scudderi** new name

1897. *Philocleon nigrovittatus* Scudder (in part not *Pezotettix nigrovittatus* Stål, 1875), Proc. U. S. N. M., xx, p. 396, pl. 26, fig. 8. Type [♂ figured by Scudder: Camacho, Zacatecas;[34] here selected, Hebard Collection Type No. 1212.]

Notes and a photograph of the dorsal aspect of the male type of Stål's *nigrovittatus*, kindly sent us by Y. Sjöstedt, compared with the material so recorded by Scudder in 1897, shows that the latter author mistook a very distinct insect for that species. It is here renamed *scudderi* and may be distinguished by the lack of tegminal pads, absence of abdominal tympana, variegated rather than definitely longitudinally trivittate thorax, caudal femur with a ventro-external row of black dots instead of a longitudinal black band and numerous other features. Brick-red markings such as are here described for the Guadalajara female of *nigrovittatus* are present in the Camacho series of *scudderi*, those dorsad duller and on the ventral surface of the caudal femora very bright but confined to the external carina and the distal portion of the internal carina.

It will be noted that Scudder's 1897 description is based wholly on *scudderi*, though he figured both its male genitalia and those of Stål's *nigrovittatus*.

*Specimens Examined.*—10; 4 males and 6 females.

Jaral, Coahuila, XI, 1 to 3, 1909, (J. Friesser), 1 ♀, [Field Mus.]. Camacho, Zacatecas, XI, 1887, (L. Bruner), 4 ♂, 5 ♀, *type, allotype, paratypes*, [Hebard Cln. and A. N. S. P.].

## DACTYLOTUM Charpentier

Comparison of the type of *corallinus* Saussure 1861, genotype of *Poepedetes*, proves with certainty that it is congeneric with *bicolor* Charpentier, genotype of that author's *Dactylotum* 1843. Thus *Poepedetes* falls as a synonym.

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[34] Also reported by Scudder from Monte Alvarez, San Luis Potosi and San Luis Potosi.

**Dactylotum flavopictum** Bruner

Durango, Durango, XI, 27, 1909, (F. C. Bishopp), 1 ♂, 1 ♀, [U. S. N. M.].

From Palmer's Assorting we learn that the originally described pair came from Monclova, Coahuila.

**Dactylotum histricum** Rehn

The two originally described females in the Academy collection are very similar to *corallinum* except that the red markings on head, pronotum and mesonotum are not as rich, the lateral spots on the mesonotum are orange, the striking pale markings on metanotum, abdomen and caudal femora are light orange yellow. The ground coloration is purplish black, the caudal tibiae showing the merest trace of a pregenicular annulus.

**Dactylotum corallinum** (Saussure)

The type, a female in the Geneva Museum, is from Lake Metztitlan, Hidalgo. It is black, marked with rich red as in *pictum*, but the red markings behind the eyes are continued to fuse across the fastigium and likewise on the metanotum the lateral spots fuse with the median spot of that color. The caudal femora have but two broad red bars and the caudal tibiae lack a proximal annulus. There is also a male at the Geneva Museum, similar but badly discolored.

Large Mexican series are required to determine the significance of the differences in coloration which have been used to distinguish "species" of this genus and its allies. Some are surely valid, some may prove to represent races or mere color variations brought about by conditions of local environment. We believe that *corallinum* is a valid species.

A female in the author's collection from Cuernavaca, Morelos, is similar to the type except that the red spots on the metanotum do not fuse, the first red bar of the caudal femora becomes obsolete meso-externally and the caudal tibiae have a prominent pregenicular (proximal) annulus of buff. The ground coloration of this specimen is purple black.

**Rhachicreagra mexicana** new species (Pl. XVIII, fig. 4)

This insect agrees with the Costa Rican *aeruginosa* Bruner in the dark antennae and absence of a distinct tubercle meso-caudad on the metanotum, but in other respects more closely resembles the Costa Rican *nothra* Rehn. The linear tegmina are considerably more elongate, reaching the exposed tympana on the metanotum.

*Type.*—♂; Cordoba, Vera Cruz, Mexico. Elevation 750 meters. September 9, 1926. (H. B. Baker.) [Acad. Nat. Sci. Phila., Type No. 5509.]

Size and form medium, very slightly larger than the type of *nothra*; surface rugosopunctate, the dorsum of the pronotum and proximal portion of abdomen sculptured by rugae which are separated by shallow pits. Head with occiput smooth; eyes moderately large and protruding, separated by a very narrow space; fastigium moderately declivent, dorsal surface medio-longitudinally finely sulcate, sides convergent with protruding lateral ocelli to the truncate but faintly obtuse-angulate emarginate apex which rounds smoothly into the frontal costa, in lateral aspect weakly produced to between antennae, then subsiding into face; frontal costa broad on face with sides parallel, broader than at juncture with fastigium, broadly subsulcate (this portion narrower and more sulcate in *aeruginosa*), below indicated by vertical carinae separated by a slightly broader sulcus to near clypeal suture, a coarse vertical lateral carina and broad vertical subocular sulcus also present on each side; surface of face with some irregular rugae. Pronotum feebly tectate as in the allied species, median carina coarse and elevated in brief cephalic portion, more elevated and terminating in a node in even briefer caudal portion; cephalic margin convex with a faint median emargination, caudal margin truncate with a small median emargination, lateral carinae absent but the rough disk clearly defined from the much smoother vertical lateral lobes; three deep sulci present laterad, two of which cut the medio-longitudinal tectation of the disk; lateral lobes wider than deep, polished with impressed punctae particularly caudad. Mesonotum and metanotum subtectate, the latter with merely an indication of a tubercle meso-caudad (where in *nothra* a prominent tubercle is present); first two abdominal tergites very finely carinate medio-longitudinally. Tegmina rudimentary linear lateral pads, scarcely wider distad than proximad, over four times as long as proximal width and reaching base of tympana. Apex of abdomen clavate, furcula absent; supra-anal plate roughly shield-shaped, lateral portions elevated above cerci and there convex, thence sub-concave convergent to the blunt apex, surface medio-longitudinally sulcate. Cerci of same general type but further developed than in Costa Rican species; stout, flattened, elongate, curved gradually inward, the ventral margin broadly convex to the rounded apex of the ventral apical portion, that represented by a large rounded flattened finger; a much smaller similar finger projecting from dorsal margin of cercus in its meso-distal portion. Prosternal spine erect, sharply rounded at the apex. Cephalic and median femora distinctly inflated and bowed. Caudal femora moderately heavy, dorsal and ventral margins with scattered and minute serrulations, a minute sharp dorsal spine at apex mesad, external pagina with sutures distinct. Caudal tibiae no longer than caudal femora, lacking an external apical spine. Tibiae and tarsi with very fine, rather long hairs; femora less hirsute. Caudal metatarsus short, apical tarsal joint slightly longer than combined length of the others. Arolium large.

Head, thorax, tegmina and proximal abdominal tergites tawny olive with numerous minute blackish flecks; decided black dots arranged at regular intervals on caudal margins of pronotum and metanotum; first and second abdominal tergites heavily suffused with blackish laterad. Eyes prouts brown with a golden luster. Antennae blackish brown. Face buffy brown with minute blackish flecks, genae suffused. Pronotum with lateral lobes greenish black with a large spot of antimony yellow ventro-cephalad and another ventro-caudad. Lateral thoracic plates greenish black, the caudal washed with antimony yellow. Abdomen dorso-distad (including supra-anal plate and cerci except the apical margins of the arms of the latter which are blackish) and limbs parrot green, the caudal femora slightly darker (the cephalic and median limbs apparently somewhat discolored). Genicular lobes of caudal femora, immediate apices of caudal tibiae and tips of spines blackish. Ventral surface courge green.

Length of body 18.2, length of pronotum 4.7, greatest dorsal width of pronotum 4.5, length of tegmen 2.6, length of caudal femur 12.4 mm.

## TETTIGONIIDAE

### PHANEROPTERINAE

### DICHOPETALA Brunner

In 1914 Rehn and Hebard revised this genus, recording from Mexico *mexicana* Brunner, *brevihastata* Morse and describing and recording from this country *falcata, serrifera, durangensis, castanea, oreoeca, tauriformis, tridactyla* and *caudelli.* In addition it is almost certain that their *pollicifera, gladiator* and *catinata* all occur in extreme northeastern Mexico.

Probably a number of unknown species of *Dichopetala* will be found in northern and central Mexico, in which regions much additional field work is sorely needed.

**Dichopetala mexicana** Brunner

Iguala, Guerrero, 1929, (H. Kruger), 1 ♂, [A. N. S. P.].

This specimen apparently differs from the originally described male only in having the cerci almost uniform yellow brown, though the apices and entire internal margins of the decided productions of the subgenital plate are heavily blackish.

**Dichopetala serrifera** Rehn and Hebard

Sierra de Nayarit, 1927, (L. Diguet), 1 ♂, [Paris Mus.]. Guadalajara, Jalisco, 1927, (L. Diguet), 2 ♂, 1 ♀, topotypes, [Paris Mus. and Hebard Cln.].

These males have the black markings of the dorsum much more reduced than in the type, reduced on the pronotum to narrow lateral lines defining the disk (in one spreading on the prozona to include all but a median line) and continued on the abdomen as narrow lateral lines, only crossing it narrowly just beyond the tegmina.

The previously unknown female is large, has the tegmina overlapping to their transverse truncate apices, the ovipositor slender and less than half as long as the caudal femur and its ventral valves proximad without a tooth on each side such as we find present in *tauriformis* Rehn and Hebard.

Nearest affinity to *falcata* Rehn and Hebard is shown.

**Dichopetala poecila** new species (Pl. XIX, fig. 1)

Closely related to *castanea* Rehn and Hebard, this insect is similarly but more brilliantly contrastingly colored and considerably larger. The male subgenital plate, though of very similar type, is considerably less produced, in fact conspicuously transverse, while its distal concave emargination is very much shallower. These features can be used to separate it from *castanea*, to which it would otherwise correctly run if Rehn and Hebard's key of 1914 were followed.[35]

*Type.*—♂; El Mante, Tamaulipas, Mexico. Elevation 80 meters. June 2, 1931. (A. Dampf.) [Hebard Collection, Type No. 1206.]

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[35] Proc. Acad. Nat. Sci. Phila., 1914, p. 72.

Size large, form medium for the genus; limbs elongate. Fastigium compressed, lamellate, touching frontal fastigium but failing to project cephalad as far by a conspicuous interval. Eye ovate, prominent. Pronotum with dorsum subdeplanate, strongly narrowed mesad, lateral margins of disk poorly defined in contour but strongly in color, diverging cephalad and caudad; cephalic and caudal margins subtruncate, showing exceedingly faint convexity; principal sulcus deep, forming a U dorsad; lateral lobes slightly shallower than in *castanea*, greatest depth contained twice in dorsal length, ventro-cephalic angle rounded obtuse-angulate (as in *castanea*), ventro-caudal angle more broadly rounded and more strongly obtuse-angulate, lateral shoulders indicated in humeral region. Tegmina much as in *castanea*; short, exposed portions in dorsal aspect appearing as broad as long; stridulating field with stridulating vein conspicuous, the sutural margin convex at its apex, without angulation indicated as is the case in *castanea*. Distal tergite with median impressed area transverse, a faint node flanking this area at free margin on each side. Supra-anal plate fused with that tergite, sub-bilobate, over two and one half times as broad as long. Cerci with proximal portion robust, straight; distal portion produced in a tapering finger curved mesad with apex spiniform; a stout flattened sub-acute tooth about twice as long as wide and not more than one-third the distal length of the cercus situated on the dorsal surface toward the external face at apex of proximal portion of cercus. Subgenital plate very broad and very strongly transverse, over twice as wide as median depth, lateral margins strongly convex convergent to the very weakly produced median portion, the very short lateral margins of that area straight to the acute disto-lateral angles between which the distal margin is shallowly emarginate, the lateral portions of this emargination faintly angulato-convex, its median section transverse, there dorsad thickly armed with minutely microscopic very short spines. Limbs very slender with ventral margins unarmed. Genicular lobes of cephalic and median femora bispinose (except one internal of former which is unispinose), of caudal femora unispinose. Foramina of cephalic tibiae apert, elliptical.

Head with face buffy brown, its dorsal surface and pronotum brown, the latter with lateral carinae suggested in paler coloration cephalad and caudad. Antennae auburn. Tegmina blackish with veins of stridulating area and distad and all of lateral fields buffy. Abdomen dorsad dresden brown with a russet tinge, the free margins of the tergites buffy brown. Femora with proximal two-fifths of cephalic, proximal three-fifths of median and proximal half of caudal lettuce green, the latter with sharply defined black dots on external pagina; other portions of femora mars yellow (richer than ochraceous tawny) except apical sixth of caudal femora which is black. Tibiae black, but with sides buffy with black flecks proximad or mesad and very brief proximal portion of cephalic and median tibiae mars yellow.

Length of body 20, length of pronotum 4.4, greatest width of dorsum of pronotum 3.1, exposed length of tegmen 3.4, greatest width across discoidal and anal field of sinistral tegmen 3, length of cephalic femur 10, length of median femur 10.3, length of caudal femur 24.1 mm.

### ARACHNITUS new genus

This extraordinary genus is nearest *Dichopetala*, as shown by the general build, unarmed cephalic coxae, pronotum lacking a humeral sinus, lobiform tegmina, male subgenital plate without styles, presence of areas exposed by the short rounded meso- and meta-sternal lobes, very slender fastigium, gently curved and heavily toothed ovipositor, cephalic femora over twice as long as pronotum and cephalic tibiae sulcate and armed dorsad and with apert foramina on both sides.

It differs in the very small size and more slender form, pronotum with lateral carinae, practically apterous female sex and exceedingly elongate and slender limbs.

GENOTYPE: *Arachnitus filicrus* here described.

### **Arachnitus filicrus** new species (Pl. XVIII, fig. 7; pl. XIX, fig. 2)

Few more distinctive species than this are known to us. The general appearance of the males superficially suggests the immature stages of *Arethaea*, the females rather that sex of *Dichopetala*.

*Type.*—♂; Oaxaca, Mexico. 1904. (L. Diguet.) [Paris Museum.]

The important characters given in the generic diagnosis are not repeated. Size very small, form very slender for the Odonturae. Eye only three-fifths as wide as long. Fastigium reduced to a delicate carina which subsides distad to the sulcus with the facial fastigium. Pronotum elongate, almost parallel (slightly nearest each other mesad), lateral carinae indicated moderately in contour and strongly in color, principal sulcus very weak and forming a rounded V directed caudad on disk but deep dorsad on lateral lobes; caudal margin of disk almost truncate, showing weakly convex obtuse angulation; lateral lobes with depth very slightly greatest meso-caudad, ventro-cephalic angle rounded rectangulate, ventro-caudal angle very broadly rounded. Tegmina minute, exposed portion no longer than wide but with complete stridulating field and veins, the narrow rounded margin beyond without venation. Supra-anal plate transverse, rounded latero-caudad. Cercus simple, moderately stout, tapering and curving inward distad to the acute apex. Subgenital plate with exposed lateral margins straight and weakly convergent to the feebly convex apical rectangulate emargination, so that the lateral apices are acute. Limbs exceedingly elongate and slender, genicular lobes of femora blunt and unarmed as are the ventral femoral margins.

*Allotype.*— ♀ ; same data as type. [Paris Museum.]

Much more robust than male. Cephalic and median limbs distinctly less elongate and less slender. Eye less elongate. Pronotum with parallel lateral carinae indicated strongly both in contour and in color; caudal margin of disk broadly concave laterad and very weakly convex obtuse-angulate mesad. Tegmina indicated by the merest rudiments, almost or wholly concealed by the pronotum. Supra-anal plate broader than long, impressed meso-proximad, margin convex. Ovipositor small, gradually tapering to apex, curved gently dorsad; dorsal margin to base and distal half of ventral margin very heavily toothed, lateral surfaces sharply nodose. Subgenital plate broader than long, triangular, with lateral margins broadly convex and apex sub-emarginate, a very coarse medio-longitudinal carina indicated.

General coloration light greenish on face and sides, a fine postocular buffy line running to apex of abdomen, this flanked ventrad by a very narrow line of purplish brown and dorsad by a suffused weaker line of the same. Dorsum thickly minutely dotted with purplish brown. Antennae and femora washed with that color, the former more buffy distad, the latter with apices and all tibiae light greenish.

In the females the postocular buffy line is weak in one, obsolete in the other, the purplish brown dotting even heavier than in the males and continued on the sides.

Length of body ♂ 11, ♀ 11; length of pronotum ♂ 2.5, ♀ 2.8; median width of pronotal disk ♂ 1.15, ♀ 2.2; exposed length of tegmen ♂ .95; length of cephalic femur ♂ 10.4, ♀ 8.3; length of caudal femur ♂ 18.6, ♀ 19; length of ovipositor 4.7 mm.

Two males and a female are paratypes, bearing the same data, of which a pair are in the author's collection.

**Dysonia fuscifrons** (Brunner)

Vera Cruz, 1914, (A. Genin), 1 ♂, [Paris Mus.]. Orizaba, Vera Cruz, I, 13, 1892, (L. Bruner; on lichens), 1 juv. ♀, [Hebard Cln.].

Mexican material has been referred to *Aphidnia*, established as a synonym of *Dysonia* by Kirby in 1906.

### INSARA Walker

Rehn and Hebard also revised this genus in 1914, placing *Hormilia* Stål as a synonym, recording from Mexico *tolteca* (Saussure), *intermedia* (Brunner), *prasina* (Saussure and Pictet), *phthisica* (Saussure and Pictet), *gracillima* (Brunner), *elegans elegans* (Scudder) and *abbreviata* (Brunner) and describing *lamellata*.

It is furthermore certain that *elegans consuetipes* (Scudder), *apache* (Rehn) and *covilleae* Rehn and Hebard will be found in extreme northern Mexico. The author also described from this country *psaronota* in 1923 and *sinaloae* in 1925.

**Insara intermedia** (Brunner)

Sierra de Pluma, Oaxaca, 1903, (L. Diguet), 2 ♂, 1 ♀, (one male with tegmina and wings greenish, one male light brown, female dark brown), [Paris Mus. and Hebard Cln.].

**Insara tolteca** (Saussure)

Vera Cruz, Vera Cruz, I, 15, 1927, [Hebard Cln.]. Santa Lucrecia, Vera Cruz, X, 1922, (J. J. White), 1 ♀, (tegmina, tibiae and caudal femora greenish), [Hebard Cln.]. Almoloyas, Oaxaca, XI, 1922, (J. J. White), 1 ♂, 1 ♀, (male largely light greenish, female largely dark brown), [Hebard Cln.].

**Insara prasina** (Saussure and Pictet)

Sierra de Nayarit, 1898, (L. Diguet), 1 ♂, [Paris Mus.].

**Insara gracillima** (Brunner)

Tampico, Vera Cruz, XII, 1906, 1 ♀, [Hebard Cln.]. Vera Cruz, Vera Cruz, I, 15, 1927, 1 ♀, [Hebard Cln.].

**Insara phthisica** (Saussure and Pictet)

Almoloyas, Oaxaca, XI and XII, 1922, (J. J. White), 3 ♀, 1 juv. ♀, (all largely dark brown), [Hebard Cln.]. Union Hidalgo, Oaxaca, 1 ♂, [Mex. Govt.].

### BRACHYINSARA Rehn and Hebard

This genus was erected in 1914 to include the single brachypterous species *magdalenae* then described from Baja California.

### PSILINSARA new genus

This genus is erected to include a single remarkable species as genotype, *annulata*, here described. Though known only from the female sex, the general structure and type of ovipositor clearly indicate closest affinity to *Insara* Walker.

These genera agree in the armed cephalic coxae; pronotal lateral lobes with a deep humeral sinus; unarmed vertex narrowly sulcate, not produced beyond antennal sockets, in contact with facial fastigium; cephalic tibiae sulcate dorsad, foramina apert; comparatively small ovipositor which is suddenly bent upward, with distal margins serrulate and convex convergent to the apex; cephalic femora pinched dorsad at apices; genicular lobes of cephalic and median femora bidentate and those of caudal femora unidentate, decidedly acute produced.

Differing from *Insara* but agreeing with the otherwise widely distinct *Brachyinsara* Rehn and Hebard, *Psilinsara* has the vertex showing two distinct steps so that its dorsal surface is flat, then declivent and again flat, and the lateral margins of the pronotal disk practically obsolete in the short prozonal portion.

The present genus is distinctive in the broader head without subocular carinae; the sharply annulate antennae (less contrastingly annulate in some species of *Insara*); comparatively much broader tegmina (except in *Insara prasina* (Saussure and Pictet)); pronotum with lateral carinae distinct except on prozona, concave on mesozona but convex on metazona; cephalic and median femora unarmed ventrad except for a single small meso-distal external spine on the latter; cephalic and median tibiae with dorsal margins unarmed at their apices, and dorsal abdominal tergites not specialized.

#### **Psilinsara annulata** new species (Pl. XIX, fig. 3)

This handsome insect, mottled light and dark brown, represents a distinctive phylum.

*Type.*—♀; Guadalajara, Jalisco, Mexico. 1897. [Hebard Collection, Type No. 1204.]

Size large for the Group Insarae, form graceful but heavier and with broader tegmina than in any species of *Insara* except *prasina*. Eyes globose, deeper than wide, much shorter than subocular portion of genae, quite strongly exserted. Vertex deplanate with lateral carinae strongly convergent, then very strongly declivent, then again deplanate, the lateral carinae approximate and parallel in the two latter portions; apex truncate, in cephalic aspect constricted mesad, with dorsal portion smaller than that in contact with the facial fastigium. Antennae decidedly surpassing organs of flight. Pronotum as described above, disk narrowing to the median line on cephalic margin, prozona laterally impressed, convex, with merest trace of lateral carinae, the latter elsewhere prominent; lateral lobes with width equal to depth, humeral sinus large and deep. Organs of flight very fully developed. Tegmina broad for group, apex rounded and nearer costal than sutural margin; ulnar vein forking, its first branch paralleling sutural margin for a considerable distance; median vein springing from proximad of median point, branching before its median point. Wings with large intercalated triangle broader than long. Ovipositor Insaroid, as described above; flanked proximad by larger plates which are produced ventrad in a curved lamella, fitting over the base of a short but decided longitudinal lamella present proximad on each side of the ventral valves. Subgenital plate narrowly shield-shaped with apex binodose. Caudal femora with five ventro-external and one ventro-internal spines.

Generally mottled bister and clay color, the darkest markings proximad on the caudal femora irregular; the paler areas on the tegmina distinctly vitreous. Wings hyaline, very faintly tinted with bister, but tinged with that color at base of intercalated triangle and solidly that color above that point to costal margin, an apical area of almost equal size including the costal margin to the intercalated triangle opaque pale ochraceous buff. Antennae prouts brown becoming bister toward each decided annulus of ochraceous buff (these annuli becoming much more elongate and much more widely separated distad).

Length of body 19.5 (estimated; abdomen extruded in type), length of pronotum 4, caudal width of pronotal disk 3.7, length of tegmen 32.6, median width of tegmen 6.7, distal width of tegmen 6.2, length of caudal femur 25, length of ovipositor 5.8 mm.

## ARETHAEA Stål

The following species were recorded from Mexico by Rehn and Hebard in their 1914 revision: *arachnopyga* Rehn and Hebard, *gracilipes gracilipes* (Thomas), *gracilipes constricta* Brunner, *insaroides* Rehn and Hebard, *carita* Scudder, *limifera* Rehn and

Hebard. In addition their *semialata* and *phantasma* probably occur in extreme northeastern Mexico.

**Arethaea gracilipes gracilipes** (Thomas)

Nogales, Sonora, 2 ♂, [A. M. N. H. and Hebard Cln.].

**Arethaea gracilipes constricta** Brunner

Monterrey, Tamaulipas, VII, 4, 1908, 1 ♂, [Hebard Cln.]. Rodriguez, Nuevo Leon, VI, 7, 1931, (A. Dampf), 1 ♀, (large), [Hebard Cln.].

This race was recorded in 1914 by Rehn and Hebard from Monclova (Montelovez was given in error), Coahuila. It is practically certain that the other specimen then recorded from Tonala, Chiapas, had been incorrectly labelled.

**Arethaea limifera** Rehn and Hebard

Six Mexican males without further data are in the Paris Museum and Hebard collections.

## SCUDDERIA Stål

Revising the genus in 1914 Rehn and Hebard recorded from Mexico *furcata furcifera* Scudder, *paronae* Griffini,[36] *ungulata* Scudder and *mexicana* (Saussure). They at that time assigned *forcipatus* to *Chloroscirtus*.

**Scudderia furcata furcata** Brunner

This race probably does not occur typical in Mexico, but the following specimens, like those which Rehn and Hebard recorded from Matamoros and Brownsville, are atypical though nearer it than *furcata furcifera*.

Rodriguez, Nuevo Leon, VI, 5 and 6, 1931, (A. Dampf; at light), 5 ♂, [Mex. Govt. and Hebard Cln.].

**Scudderia furcata furcifera** Scudder

Puebla, Puebla, (H. Lucas), 2 ♂, 1 ♀, [Paris Mus.]. Cordoba, Vera Cruz, X, 19, 1924, 1 ♂, [Hebard Cln.].

**Scudderia furcata sinaloae** new subspecies

This race is extremely close to *furcata furcifera* Scudder.

*Type.*—♂; Venvidio, Sinaloa, Mexico. August 18, 1918. (J. A. Kusche.) [Hebard Collection, Type No. 1201.]

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[36] Prior Mexican records of *curvicauda* were based on material of this species.

Agrees fully with *furcata furcifera* except as follows. Size averaging slightly larger, form distinctly more elongate. Stridulating field more produced at apex of stridulating vein, due to decidedly greater length of the latter. Apex of supra-anal plate heavier, quite similar to that developed in the atypical condition of the species found in the western United States.

*Allotype.*—♀; same data as type but taken August 15, 1918. [Hebard Collection.]

Generally indistinguishable from this sex of *furcata furcifera* except that the size averages slightly larger and the form is distinctly more elongate. The ovipositor is exactly similar, not heavier as in the atypical condition of the species found in the western United States.

No color difference from *furcata furcifera* is shown.

The extremes measure: length of pronotum ♂ 5.8 to 6.1, ♀ 5.8 to 6; length of tegmen ♂ 32 to 34.3, ♀ 32.7 to 34; length of caudal femur ♂ 24 to 28, ♀ 24.3 to 30.3; length of ovipositor 6.8 to 7.1; width of ovipositor 1.8 to 2 mm.; greatest width of tegmen ♂ 6.8 to 6.9, ♀ 6.4 to 7.

*Specimens Examined.*—22; 9 males, 12 females and one immature female.

Venvidio, Sinaloa, VIII, 11 to IX, 2, 1918, (J. A. Kusche), 8 ♂, 9 ♀, 1 juv. ♀, (VIII, 8), [Hebard Cln.]. Los Mochis, Sinaloa, XII, 2 to 10, 1917, (J. A. Kusche), 3 ♀, [Hebard Cln.]. Villa Union, Sinaloa, IX, 27, 1918, (J. A. Kusche), 1 ♂, [Hebard Cln.].

Specimens from Tepic, Nayarit, originally referred to *furcifera* but placed by us as *paronae* in 1914 and a male from Cuernavaca, Morelos, taken in September by O. W. Barrett, apparently represent atypical material of the present insect. It is also true that the male referred by us to *paronae* from Orizaba, Vera Cruz, actually represents atypical *furcifera*, but the females from that locality and Atoyac we here refer to *mexicana*.

### **Scudderia paronae** Griffini

Iguala, Guerrero, (H. Kruger), 1 juv. ♀, [A. N. S. P.]. Almoloyas, Oaxaca, II, 18 and XII, 1922, (J. J. White), 1 ♂, 1 ♀, [Hebard Cln.].

We recorded an immature from Venvidio, Sinaloa, in 1925 and additional immatures are now before us from Villa Union in that State. There is less certainty in our mind now as to the identity of these specimens. As will be seen from the notes under *furcata sinaloae,* we have no adults assignable to *paronae* from north of Oaxaca.

**Scudderia ungulata** Scudder

Cerro San Juan, Nayarit, 1898, (L. Diguet), 1 ♂, [Hebard Cln.]. Sierra de Nayarit, 1897, 1 ♂, [Paris Mus.]. Guadalajara, Jalisco, 1897, (L. Diguet), 1 ♀, [Paris Mus.].

The males have the caudal femora annulate distad and the caudal tibiae darkened and flecked as in both sexes of the original series. The Guadalajara female lacks these markings, as do all but a single male in our previously recorded series from that locality.

**Scudderia mexicana** (Saussure)

Sierra de Nayarit, 1898, 1 ♀, [Paris Mus.]. Guadalajara, Jalisco, 1897 to 1903, (L. Diguet), 3 ♂, 3 ♀, [Paris Mus.]. Zitacuaro, Michoacan, X, 1908, (L. Diguet), 2 ♂, 1 ♀, [Paris Mus. and Hebard Cln.]. Coatepec, Vera Cruz, V to VI, 1922, (Conradt), 1 ♀, [Hebard Cln.].

The females from Atoyac and Orizaba, Vera Cruz, which in 1914 Rehn and Hebard referred to *furcata furcifera,* also represent this species.

**Chloroscirtus forcipatus** (Brunner)

Venvidio, Sinaloa, VII, 28 to VIII, 1, 1918, (J. A. Kusche), 1 ♀, [Hebard Cln.].

Without males we can not be certain of this determination. The species was removed from *Scudderia* by Scudder in 1914.

**Chloroscirtus discocercus** Rehn

Medellin, Vera Cruz, (T. Heyde), 1 ♂, [Hebard Cln.].

Described from Costa Rica, additional material is before us from Nicaragua and Panama.

It is probably a male of this insect which Saussure and Pictet described from Teapa, Tabasco, in 1897 as a variety of *forcipatus.*

**Stilpnochlora azteca** (Saussure)

Escuinapa, Sinaloa, (J. H. Batty), 1 ♀, [A. M. N. H.]. Guadalajara, Jalisco, 1898 and 1903, (L. Diguet), 8 ♀, [Paris Mus.]; (D. L. Crawford), 1 ♀, [A. N. S. P.]. Zitacuaro, Michoacan, X, 1908, (L. Diguet), 2 ♂, [Paris Mus. and Hebard Cln.].

Toluca, Mexico, 1908, (L. Diguet), 1 ♀, [Paris Mus.]. Medellin, Vera Cruz, (T. Heyde), 2 ♀, [Hebard Cln.].

**Stilpnochlora thoracica** (Serville)

Jalapa, Vera Cruz, VI, 1, 1894, (C. L. Smith), 1 ♂, [Hebard Cln.]. Coatepec, Vera Cruz, V to VI, 1922, (Conradt), 1 ♂, [Mex. Govt.]. Cordoba, Vera Cruz, 1 ♀, paratype of *tolteca*, [Hebard Cln.]. Guadalajara, Jalisco, 1903, (L. Diguet), 1 ♂, 1 ♀, [Paris Mus.]. Almoloyas, Oaxaca, XI, 1922, (J. J. White), 1 ♂, [Hebard Cln.].

**Stilpnochlora quadrata** (Scudder)

Cuernavaca, Morelos, V, 16, 1898, 1 ♀, [Hebard Cln.]. Cordoba, Vera Cruz, X, 2, 1929, 1 ♂, [Hebard Cln.]. Chichen Itza, Yucatan, (E. Thompson), 3 ♀, [Field Mus. and Hebard Cln.].

In the Cordoba male the caudal margin of the pronotum is not only more heavily black than is usual, but a heavy line of black crosses the stridulating fields of the tegmina proximad and the margins of these fields are separated from the discoidal fields by a black line. This latter marking is shown in no other specimen of our series of the species.

All Mexican material previously referred to *marginella* is probably referable to this species. Rehn in his 1917 study of the Group Steirodontia points out that *marginella* is confined to South America.

## AMBLYCORYPHA Stål

In their 1914 revision Rehn and Hebard record *huasteca* (Saussure) and their *insolita* from Mexico. A third Mexican species, *tepaneca*, has not been seen by us.

**Orophus mexicanus** Saussure

Orizaba, Vera Cruz, XII, 1, 1887, (L. Bruner), 1 ♂, 2 ♀, (green), [Hebard Cln.]. Puebla, Puebla, (H. Lucas), 4 ♂, 4 ♀, (green), [Paris Mus.].

**Orophus tessellatus** Saussure

The type of *Phylloptera annulata* Rehn 1901, which name we placed in the present synonymy in 1924, is before us, a brown male from Presidio, Vera Cruz.

**Montezumina oblongoculata oblongoculata** (Brunner)

San Rafael, Vera Cruz, (C. H. T. Townsend), 1 ♀, [Hebard Cln.]. Orizaba, Vera Cruz, XII, 1, 1887 and I, 1892, (L. Bruner), 1 ♂, 2 ♀, [Hebard Cln.]. Acapulco, Guerrero, XII, 17, 1921, 1 ♂, [Hebard Cln.]. Sierra de Pluma, Oaxaca, 1903, (L. Diguet), 1 ♂, [Paris Mus.].

We erected this genus with this species as genotype in 1925, then describing *sinaloae*. The previously described Mexican species had been included in *Turpilia*[37] and then *Diplophyllus*, but *Montezumina* is actually nearer *Anaulacomera*.

**Anaulacomera oaxacae** new species (Pl. XIX, figs. 4 and 5)

This is a comparatively broad winged species, clearly nearest the Panamanian *crassidentata* Hebard.[38]

From that species it differs in the decidedly larger size and more robust build, with organs of flight proportionately shorter, tegmina broader, more definitely but not outstandingly thicker apices of the male cerci and stouter ovipositor.

These species and *denticauda* are particularly distinguished from the other Mexican species assigned to *Anaulacomera* by the distinctly sulcate dorsal surface of the cephalic tibiae. Compared with *oaxacae* we find *denticauda* to be smaller and more graceful, with apices of male cerci scarcely thickened and ovipositor much longer and straighter with marginal teeth not as heavy and its lateral surfaces distad much less roughened.

It would appear that these species are more closely related to each other than to *gracilis* Brunner, to which *crassidentata* was originally believed to show nearest affinity.

*Type.*—♂; Almoloyas, Oaxaca, Mexico. November, 1922. (J. J. White.) [Hebard Collection, Type No. 1194.]

Size medium, structure heavy for the genus. Fastigium sulcate above, its cephalic face rather broad but distinctly narrower than the first antennal joint, separated from the facial fastigium by a mere line. Pronotal lateral lobes with length slightly greater than depth. Tegmina and wings less strongly caudate than usual in *Anaulacomera*, the former broad for the genus with median vein branching at (or slightly before) median point.

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[37] In section a of Saussure and Pictet's key to *Turpilia*; *ocularis* and *oridiops*, both species we have not yet seen.

[38] For detailed comparison with other species see Trans. Amer. Ent. Soc., LIII, p. 99, (1927).

Ultimate tergite truncate, showing a meso-distal depressed area, the free margin on each side of this being weakly convex. Supra-anal plate triangular with apex broadly rounded, deflexed, distinctly longer than broad. Cerci simple, elongate, curving moderately inward, slender, showing distinct distal thickening, the apex armed with a minute tooth directed inward. Subgenital plate with broad apex very broadly obtuse-angulate emarginate (sometimes showing concavity) between the small nodiform non-articulate appendages which are no longer than wide. Limbs short and caudal femora robust for the genus. Ventral femoral margins unarmed except those of caudal limbs which bear often one external (very rarely one internal) minute tooth. Cephalic tibiae with dorsal surface distinctly sulcate.

*Allotype.*— ♀ ; same data as type. [Hebard Cln.].

Very similar to male in size, form and ambisexual characters except organs of flight which are even less elongate. Ovipositor not elongate, not widening meso-distad, weakly curved dorsad, with apex acute; margins armed distad with triangular teeth which are unusually heavy for the genus, lateral surfaces there coarsely and sharply nodulose. Subgenital plate triangular with lateral margins weakly convex and apex blunt, slightly broader than long.

General coloration veronese (light) green. Tegmina immaculate except for inconspicuously darkened dorsal cells in both sexes and median portion of stridulating area in male which is extensively and heavily darkened (sometimes including the veins, sometimes leaving these pale). Minute pink flecks present and numerous on caudal femora only in well preserved specimens.

The present series agrees closely with the described pair in measurements: length of body ♂ 20.3, ♀ 19; length of pronotum ♂ 4.7, ♀ 4.7; length of tegmen ♂ 24.7, ♀ 23.2; width of tegmen ♂ 5.8, ♀ 5.7; length of caudal femur ♂ 19.8, ♀ 18.7; length of ovipositor 8.1 (paratype 8) mm.

A pair bearing the same data as the type and a male in the author's collection from San Lucrecia, Vera Cruz, taken in October 1922 by J. J. White are considered paratypes.

**Anaulacomera laticauda** Brunner

In 1927 we selected Orizaba, Vera Cruz, as the type locality and referred Rehn's *Symmetropleura teocelae* to synonymy.

Three previously recorded males from Teocelo and San Lorenzo near Cordoba, Vera Cruz, are in the Philadelphia collections.

Santa Isabel, Sierra Madre, Chiapas, XI, 17, 1930, (at light), 1 ♀, [Hebard Cln.]. Head of Usumacinta River, Chiapas, (R. M. Walker), 1 ♀, [U. S. N. M.].

**Anaulacomera denticauda** Brunner

Merida, Yucatan, (G. F. Gaumer), 2 ♂, 1 ♀, [Hebard Cln.].

**Phylloptera festae** Griffini

Near Santa Lucrecia, Vera Cruz, XI, 9, 1930, (on light in train), 1 ♂, [Hebard Cln.].

This specimen has a brown spot mesad on the tegmina. Such a spot is present in two of the ten other specimens of *festae* before us.

The species is represented by material from Guatemala, Nicaragua and Panama in the Philadelphia collections. The genus was previously unknown from as far north as Mexico.

### **PHRIXA** Stål

Though we need additional material, as only six specimens of the genus are before us, study of the literature gives the impression strongly that *nasuta* Stål, based on a female from Cordoba, Vera Cruz, will prove to have as synonyms, *sima* Brunner described from two females from Orizaba and Vera Cruz, *schumanni* Saussure and Pictet described from a female from Atoyac, Vera Cruz, *hoegei* Saussure and Pictet based on a male from Cordoba, Vera Cruz and *bidentata* Rehn based on a male from Orizaba, Vera Cruz.

We recognize the following species, particularly separable by the characters here given.

A. Pronotum not carinate. (Tegmina elongate, humeral trunk straight, apex nearer costal than sutural margin with the latter distad strongly oblique to that point. Humeral sinus of pronotal lateral lobes conspicuous, sharply rounded and almost rectangulate.)
  B. Male cerci extremely elongate with apex attenuate. Yucatan and southern Florida. . *maya* Saussure and Pictet
  BB. Male cerci elongate with apex dilated, lamellate. Vera Cruz, Puebla and Oaxaca. . . . . . . . . . . . . . . . . . . . *nasuta* Stål

AA. Pronotum carinate.
  B. Pronotum with prozona distinctly carinate, metazona as distinctly sulcate. Tegmina and humeral sinus of pronotal

lateral lobes as in section A. Male cerci much as in *nasuta*. Puebla..............................*puebla* new species

BB. Pronotum with a percurrent medio-longitudinal carina. Tegmina shorter, humeral trunk broadly arcuate, apex mesad with sutural margin distad scarcely more oblique to that point than costal margin. Humeral sinus of pronotal lateral lobes weak, shallow and very broadly rounded. Male cerci with apex more simple and decidedly less strongly dilated. Nayarit...................*carinata* new species

**Phrixa nasuta** Stål

Teocelo, Vera Cruz, IX, (O. W. Barrett), 1 ♀, recorded by Rehn in 1902 as *schumanni*, [A. N. S. P.]. Orizaba, Vera Cruz, VI, (O. W. Barrett), 1 ♂, type of *bidentata* Rehn, 1902, [A. N. S. P.]. Puebla, Puebla, 1 ♂, [Hebard Cln.].

These males have the toothed portion of the apex of the cercus more produced than in Saussure and Pictet's figure of *hoegei*. Rehn was mistaken when he stated that the extremity of the cerci was bidentate in the male he described as *bidentata*.

**Phrixa puebla** new species (Pl. XIX, figs. 6 and 7)

This insect is very similar to *nasuta*, except for the carinate prozonal portion of the pronotum.

*Type.*—♂; Sierra de Zacapoaxtla, Puebla, Mexico. [Hebard Collection, Type No. 1195.]

Major features of diagnostic value are given in the present key to *Phrixa*. Fastigium much as in *nasuta*; extending slightly beyond proximal antennal joint when that joint is directed dorsad, dorsal surface feebly sulcate. Ventro-caudal angle of pronotal lateral lobes broadly rounded rectangulate. Tegmina elongate, widening gradually to distal third; median vein branched proximad on dextral tegmen (as is usual in the related species) unbranched on sinistral tegmen. Genicular lobes of femora dentate, with or without a minute spine ventrad. Ventral margins of caudal femora only, armed with numerous small spines. Dorsal surface of cephalic tibiae sulcate.

Specimen discolored. Probably uniform light green in life. Head with a fine medio-longitudinal line continued to apex of fastigium and prozonal carina light yellowish.[39] Median portion of the broad stridulating field brown, as in *nasuta*.

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[39] Among our specimens of *nasuta* the Orizaba male alone has such a line extending from the base of the fastigium to the principal sulcus on the pronotum.

Length of body 23.4, length of pronotum 5.8, length of tegmen 32.2, greatest tegminal width 12.3, width of tegminal marginal field 5.6, length of caudal femur 19 mm.

**Phrixa carinata new species** (Pl. XIX, figs. 8 and 9)

The strongly carinate pronotum and differently shaped tegmina give this species a very distinctive appearance.

*Type.*—♂; Sierra de Nayarit, Mexico. [Hebard Collection, Type No. 1196.]

Size small, form medium, organs of flight not as ample as in the other species of *Phrixa.* Fastigium extending slightly beyond proximal antennal joint when that joint is directed dorsad, even more slender than in *nasuta*, its dorsal surface feebly sulcate. Pronotum with a heavy, percurrent medio-longitudinal carina, humeral sinus shallow, caudal margin of disk convex truncate instead of evenly convex. Tegmina shorter and less coriaceous than in *nasuta*; foliaceous, with venation in distinct relief, humeral trunk arcuate so that the acute apex is situated mesad, the costal margin almost as oblique to that point as the sutural margin in distal three-fifths, median vein unbranched. Ultimate tergite truncate; supra-anal plate triangular, its dorsal surface deeply concave (possibly due to distortion). Cerci elongate, curved inward with this greatest at five-eighths distance from base; apex moderately dilated, its dorsal surface concave, external margin rounding to terminate at the acute disto-internal termination (clearly of the type developed in *nasuta*, but showing much less extensive specialization). Subgenital plate with apex broad and broadly obtuse-angulate emarginate between the style sockets.[40] Limbs as described for *puebla* except the femoral genicular lobes which are all unidentate.

General coloration light green, head with a fine medio-longitudinal line continued to apex of fastigium of light yellowish. Antennae and pronotal carina discolored, possibly buffy in life. An area of blackish brown present mesad in the broad stridulating field.

Length of body 21.3, length of pronotum 5.7, length of tegmen 23.3, greatest width of tegmen 11.3, width of tegminal marginal field 5, length of caudal femur 18.8 mm.

**Pycnopalpa bicordata (Serville)**

Vera Cruz, Vera Cruz, (T. Heyde), 1 ♀, [Hebard Cln.].

Rehn's *mortuifolia*, described from Teocelo, Vera Cruz, in 1902, was correctly synonymized by Vignon in 1924.

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[40] The styles are missing.

Variation is to be expected in the areas resembling desiccated spots on leaves such as occur on the tegmina of this species. Vignon has recently described two such variations in an elaborate and highly valuable treatment of the species. Naming such variations is, however, most unfortunate and as racial separation is not possible in either case we are obliged to place his varieties *punctulata* and *morata* in the present synonymy.

In the female from Vera Cruz the pair of tubercles on each side of the fastigium proximad are prominent and a much larger and longer similar projection is present just before the fastigium, while a slender straight finger is present mesad on the cephalic margin of the pronotum directed dorso-cephalad. Such projections are similar but slightly less prominent, particularly the latter, in a Teocelo, Vera Cruz, male; slightly less prominent in a Guatemalan male; generally even less conspicuous in six specimens from Nicaragua, Costa Rica, Panama and Colombia, while still greater reduction in these projections is shown by males from Parahyba and Rio de Janeiro, Brazil and northern Argentina, the node before the fastigium being practically obsolete in these. Were not so much individual variation present we would consider the northern insect a distinct race, for which the name *mortuifolia* Rehn would be available.

### TURPILIODES new genus

This genus is based on *Turpilia mexicana* Brunner,[41] genotype by monotypy, described from a female from Oaxaca, Mexico. It is distinguished from *Turpilia* by the strongly sulcate dorsal surfaces of the cephalic and median tibiae. The material here recorded shows the following additional differences; fastigium slender, tapering to a sharply rounded acute apex which is separated from the facial fastigium by a brief space; pronotal lateral lobes with humeral sinus deeper and more sharply rounded, their caudal margin more oblique, and ventral margins of median femora unarmed.

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[41] Kirby was incorrect in indicating this species as genotype of *Turpilia* in 1906. The genotype of *Turpilia* is *punctata* Stål, by monotypy.

In all other features given for *Turpilia* by Brunner,[42] close agreement is shown.

**Turpiliodes mexicanum** (Brunner)

We believe that no Mexican species have been described which are referable to *Turpilia.* The present species is clearly a member of a distinct though closely related genus and the following material has enabled us to describe that genus here.

San Pedro Sula, Honduras, II, 25, 1922, (J. Leinhardt), 1 ♀, [Hebard Cln.]. Lancetilla, Atlantida, Honduras, (J. A. G. Rehn; on house at night), 1 ♀, [A. N. S. P.].

The superficial resemblance to West Indian species of *Turpilia* is close.

### MICROCENTRUM Scudder

From study of the following species it is evident that the structure of the apices of the male cerci and the female ovipositor offer constant characters of the highest value. The width and degree of sulcation of the vertex is also very important. The form of the cephalic margin of the pronotum, tegminal contour and venation and apex of male subgenital plate and its styles also show characters, sometimes of great value, but in some species subject to considerable individual variation.

We are satisfied that the species are much less difficult to separate than might be supposed from the considerable amount of confusion which is found in past literature.

**Microcentrum myrtifolium** Saussure and Pictet

Comparison of the male type of *syntechnoides* Rehn from Cuernavaca, Morelos, with a paratypic male of *myrtifolium* from Brazil in the author's collection, shows no features by which the former can be separated. There is also a male from San José, Costa Rica, in the author's collection.

Cuernavaca, Morelos, VII, 1 to 5, 1905, (W. L. Tower; at light), 1 ♂, [A. M. N. H.]. Mexico, 1 ♀, reported as *laurifolium* by Rehn in 1902, [A. N. S. P.].

**Microcentrum rhombifolium** (Saussure)

Cuernavaca, Morelos, VI, 24 to 27, 1903, (W. L. Tower), 2 ♂, 1 ♀, [A. M. N. H. and Hebard Cln.]. Barranca southwest of

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[42] Monogr. der Phaneropteriden, p. 324, (1878).

Cuernavaca, Morelos, (W. L. Tower; in orchard), 2 ♂, [A. M. N. H. and Hebard Cln.].

These males measure as follows; length of body 24.2 to 25.8, length of pronotum 6.4 to 6.8, length of tegmen 43.4 to 49.3, greatest tegminal width 12.8 to 14.8, length of caudal femur 21 to 23.3 mm.

This species, common in the eastern and southwestern United States, was recorded by us from Venvidio, Sinaloa, in 1925. We believe that most of the prior records of the species from Mexico were based on material of other species. It is probable that *rhombifolium* does not occur in southern Mexico.

**Microcentrum suave** Hebard

This species, described from Sonora, Sinaloa and Nayarit in 1923, is here compared with *simplex*, to which nearest affinity is shown.

**Microcentrum simplex** new species (Pl. XX, fig. 1; pl. XXI, figs. 9 and 10)

This insect looks very much like a small edition of *rhombifolium*, agreeing very closely in size and contour of fastigium, pronotum with a distinct angulate production of the cephalic margin, deep lateral lobes and tegminal contour (though averaging narrower) and venation. It is easily distinguished by the smaller size, rough pronotal metazona, distinctive male cerci and subgenital plate and even smaller female ovipositor.

From it, *suave* differs in having the pronotal disk smooth with cephalic margin not produced mesad, the tegmina narrower with stridulating vein not as long and not sulcate, the decidedly weaker production of the male subgenital plate at the bases of the styles and smaller and triangular emargination of its caudal margin. The close similarity of the vertex, cerci, size and general appearance shows, however, that these species are quite closely related. The ovipositor is slightly but distinctly smaller with dorso-distal convexity broader.

Rehn recorded a male from Teocelo, Vera Cruz, in 1902, as *laurifolium*. A portion of the material recorded as that species by Saussure and Pictet in 1898 probably also represents *simplex*. Close relationship to *securiferum* Brunner, described from Chiriqui, Panama, may exist.

*Type.*—♂; Morales, Izabal, Guatemala. August, 1929. (J. J. White.) [Hebard Collection, Type No. 1197.]

Size small, form medium for the genus. Head much as in *suave*; lateral ocelli large, fastigium convex-declivent and longitudinally feebly sulcate, with width at transverse sulcus (separating it from frontal fastigium) distinctly less than twice that of proximal antennal joint. Pronotum smooth except metazona which is rugulose and impresso-punctate, the discal sulci distinct, showing a distinct rounded obtuse-angulate production of the cephalic margin mesad, strongly rounded lateral margins, deep lateral lobes (though not as deep as in *suave* or *rhombifolium*) with deep humeral sinus. Tegmina distinctly widest just beyond apex of the ample stridulating area, in which the stridulating vein is elongate, broad and longitudinally sulcate, median vein sinuous with branches running to sutural margin, veins at costal margin not thickened. Wings well surpassing tegmina. Ultimate tergite truncate. Supra-anal plate vertical; elongate triangular, with apex rounded. Cerci elongate, cylindrical, slender, tapering slightly and incurved, with apices rounded and armed dorsad before the end with a flattened, chisel-shaped tooth, directed parallel to the shaft with apex extending an equal distance. Subgenital plate with lateral weakly convergent rounded carinae which are produced distad a distance slightly greater than the length of the small styles which surmount them and which are less than three times as long as broad; plate with a fine mediolongitudinal carina which (usually) causes a slight median projection of the transverse distal margin. Ventral femoral margins with cephalic internal, median external and both caudal armed with minute spines.

*Allotype.*— ♀ ; same data as type but taken in July. [Hebard Cln.].

Very similar to male but larger and more robust. Tegmina broader and showing stronger narrowing beyond proximal portion. Ovipositor extremely small, bent suddenly mesoproximad (but apparently not as suddenly as in *suave*) and with dorsad curvature strong; dorsal valves with dorsal margin more broadly rounded dorso-distad than in *suave*, armed distad with minute teeth the more distal of which are elongate; ventral valves with short distal margin transverse and similarly toothed with the dorsal tooth considerably the longest. Subgenital plate small, triangular.

General coloration bright courge green (light). Stridulating field of male tegmina immaculate. Tegmina and limbs immaculate except tympanal area of cephalic tibiae which is brownish buff, the dorso-external portion there black (this very conspicuous in the Guatemalan and Honduran males, weak or obsolete in some of the Mexican specimens and some of the Honduran females), the external tympanum often with a suffused longitudinal line (which also often appears in *suave*).

| ♂ | Length of body | Length of pronotum | Length of tegmen | Greatest width of tegmen | Length of caudal femur | Length of ovipositor |
|---|---|---|---|---|---|---|
| Morales, Guatemala. *Type.* | 19.8 | 5.3 | 35.7 | 10.7 | 19.8 | |
| Morales, Guatemala. *Paratype.* | 22 | 5.6 | 37.2 | 11 | 22 | |
| Potrerillos, Honduras. | 21.2 | 5.4 | 35.8 | 11 | 21 | |
| San Rafael, Mexico. | 19 | 5.2 | 33.7 | 9.8 | 18.2 | |
| ♀ | | | | | | |
| Red Tank, Canal Zone. | 21.2 | 5.8 | 36.6 | 12.6 | 22.7 | 4.7 |
| Morales, Guatemala. *Allotype.* | 24.5 | 5.7 | 36.2 | 13 | 20.3 | 4.4 |
| Morales, Guatemala. *Paratype.* | 25.8 | 6.1 | 39.7 | 13.2 | 25.1 | 4.8 |
| Tehuacan, Mexico. | 22 | 5.8 | 35 | 11.3 | 20 | 4.6 |

*Specimens Examined.*—23; 19 males and 4 females.

San Rafael, Vera Cruz, Mexico, (C. H. T. Townsend), 1 ♂, [Hebard Cln.]. Teocelo, Vera Cruz, Mexico, IX, (O. W. Barrett), 1 ♂, [A. N. S. P.]. Tehuacan, Puebla, Mexico, 1903, (L. Diguet), 1 ♀, [Hebard Cln.].

Potrerillos, Cortes, Honduras, 800 feet, VIII, 20, 1930, (J. A. G. Rehn), 1 ♂, [A. N. S. P.].

Morales, Izabal, Guatemala, VII to IX, 1929, (J. J. White), 16 ♂, 3 ♀, *type, allotype, paratypes,* [Hebard Cln. and Paris Mus.].

France, Field, Canal Zone, Panama, VII, 7, 1920, (M. Hebard; on leaves of swamp forest undergrowth at night), 1 ♀, [Hebard Cln.]. Red Tank, Canal Zone, Panama, VII, 1, 1924, (N. Banks), 1 ♀, [Mus. Comp. Zool.].

**Microcentrum stylatum** new species (Pl. XX, fig. 2; pl. XXI, figs. 11 and 12)

1898. *Microcentrum retinerve* Saussure and Pictet (in part not *Phylloptera retinervis* Burmeister, 1838), Biol. Cent.-Amer., Orth., I, p. 361, pl. 17, figs. 6 to 8.*

This species would appear to be nearest *simplex* but examination shows it to belong to a distinct group which includes *totonacum,* distinguished by the comparatively narrow and strongly sulcate fastigium, pronotum with cephalic margin concave, disk showing three transverse depressions (weak in *stylatum*), pronotal lateral lobes not as deep as in the preceding species, tegmina generally more rounded and less oblique to the more broadly rounded apices, proximal branch of median vein running to very near ulnar vein and thence to sutural margin so forming an angulation and ovipositor large for the genus.

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* The figures are excellent for the present species except number seven, in which the pronotal lateral carinae are too divergent and much too acute.

From *totonacum* we separate *stylatum* by the smaller size, less elongate form, pronotum with transverse depressions weaker and principal sulcus cutting lateral margins of disk less deeply, much less extensive marking and punctulation, male cerci thickened at apex and ovipositor showing scarcely any apical truncation.

*Type.*—♂; San Rafael, Vera Cruz, Mexico. (C. H. T. Townsend.) [Hebard Collection, Type No. 1198.]

Size small, form very slightly more robust than in *simplex*. Head with lateral ocelli large; vertex convex declivent, longer than broad and longitudinally strongly sulcate, with lateral margins little convergent so that the width at the transverse sulcus (separating it from the frontal fastigium) is slightly less than twice that of a proximal antennal joint. Pronotum smooth but with disk showing three transverse depressions, the discal sulci weak but the principal sulcus prominent dorsad on the lateral lobes and cutting the strongly rounded lateral margins of the disk; cephalic margin evenly concave; lateral lobes and humeral sinus as in *simplex*. Tegmina distinctly widest just beyond apex of the ample stridulating area in which the stridulating vein is moderately elongate and longitudinally not sulcate.[43] Median vein sinuous with first branch angulate as described above, veins at costal margin not thickened. Wings, ultimate tergite and limb armament as described for *simplex*. Supra-anal plate shield-shaped, vertical, decidedly broader than in *simplex*. Cerci elongate, cylindrical, slender, tapering slightly and moderately curved inward with apices moderately enlarged and rounded, armed at apex with a short flattened tooth directed inward, beneath which is a small inconspicuous nodiform projection. Subgenital plate with lateral, weakly convergent, rounded carinae which distad are produced less than one-third the length of the very elongate, simple, cylindrical styles which surmount them and which are about five times as long as broad; plate with a fine medio-longitudinal carina terminating at the base of the U-emargination between the projecting bases of the styles.

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[43] In a few specimens this vein is longitudinally sulcate, as is usual in *simplex*. Though this feature is as a rule different in these species, it is, therefore, not constant.

*Allotype.*— ♀ ; same data as type. [Hebard Cln.].

Very similar to male, but larger and more robust. Tegmina broader. Ovipositor large for the genus, bent suddenly proximad and curved moderately strongly dorsad; dorsal valves with dorsal margin rather broadly convex distad, armed to base with small but decided teeth; ventral valves with ventral margin broadly convex ventro-distad so that none of the usual truncation is present, armed distad with minute teeth which beyond the curvature are decided. Subgenital plate small, triangular.

General coloration bright courge green (light). Stridulating area of male tegmina often immaculate, but frequently light brown before and including the stridulating veins and sometimes with a fleck of dark brown mesad in the former. Lateral margins of pronotum broadly supplied with very minute black punctulae, these rarely present on median tibiae, cephalic femora distad and cephalic tibiae proximad. Tympanal area of cephalic tibiae very rarely purplish brown, but tympana themselves frequently with a fine longitudinal black line.[44]

| ♂ | Length of body | Length of pronotum | Length of tegmen | Greatest width of tegmen | Length of caudal femur | Length of ovipositor |
|---|---|---|---|---|---|---|
| San Rafael, Mexico. *Type.* | 18.8 | 5.3 | 34.7 | 11.1 | 19 | |
| San Pedro Sula, Honduras. | 21.8 | 5.8 | 38.8 | 13.2 | 19.7 | |
| Rosario, Honduras. | 20.2 | 5.7 | 39.2 | 13 | 18.9 | |
| Eden, Nicaragua. | 19 | 5.3 | 33 | 10.8 | 18.2 | |
| San Pedro, Nicaragua. | 21.6 | 6 | 37.7 | 13 | 20 | |
| Irazu, Costa Rica. | 18.8 | 5.8 | 37 | 12.2 | 17.8 | |
| ♀ | | | | | | |
| San Rafael, Mexico. *Allotype.* | 18.6 | 5.7 | 35 | 12 | 19.6 | 6.6 |
| Pueblo Viejo, Mexico. *Paratype.* | 23 | 5.7 | 35.3 | 12.2 | 19.8 | 6.7 |
| Puebla, Mexico. | 22 | 6 | 36.7 | 13 5 | 18.7 | 6.3 |
| La Carpentera, Costa Rica. | 18.5 | 5.7 | 34.7 | 12.6 | 17 | 5.8 |

*Specimens Examined.*—19; 14 males, 4 females and 1 immature individual.

Pueblo Viejo, Vera Cruz, Mexico, XII, 8, 1909, (F. C. Bishopp), 1 ♀, *paratype,* [U. S. N. M.]. San Rafael, Vera Cruz, Mexico, (C. H. T. Townsend), 1 ♂, 1 ♀, *type* and *allotype,* [Hebard Cln.]. Puebla, Puebla, Mexico, (H. Lucas), 1 ♀, [Paris Mus.].

Guatemala, 1 ♂, [Hebard Cln.].

San Pedro Sula, Cortes, Honduras, II, 25 to IV, 15, 1922, (J. Linehart), 4 ♂, [A. N. S. P.]. Rosario, San Jacinto Mountains, Olancho, Honduras, VII, 25, 1930, (J. A. G. Rehn; from foliage), 1 ♂, (teneral), [A. N. S. P.].

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[44] We have found such markings, though sometimes absent and never conspicuous, when present of real value in distinguishing species from related forms in which they never occur.

Eden, Pis Pis District, Nicaragua, IV, 23 to V, 21, 1922, (W. Huber; at light), 5 ♂, [A. N. S. P. and Hebard Cln.]. Great Falls, Pis Pis River, Nicaragua, V, 26, 1922, (W. Huber), 1 ♂, [A. N. S. P.].

Volcan de Irazu, Costa Rica, VI, 22, 1902, (L. Bruner), 1 ♂, [Hebard Cln.]. La Carpentera, Candelaria Mountains, Costa Rica, 5100 to 6100 feet, IX, 4, 1923, (J. A. G. Rehn; beaten from edge of forest), 1 ♀, [A. N. S. P.].

**Microcentrum totonacum** (Saussure)

We are certain that *totonacum* is not a synonym of *retinerve*, a species which does not occur in tropical Mexico. Bruner first so assigned it and he was followed by Saussure and Pictet and subsequent authors.

Teocelo, Vera Cruz, IX, (O. W. Barrett), 1 ♂, [A. N. S. P.]. Coatepec, Vera Cruz, V to VI, 1922, (Conradt), 1 ♂, [Hebard Cln.].

Length of body 23.2 and 24, length of pronotum 6.7 and 6.8, length of tegmen 43.7 and 43.6, greatest tegminal width 13.7, length of caudal femur 21.5 mm.

Saussure originally stated that the pronotal lateral margins were twice emarginate. This is the only species in which not only does the principal sulcus cut these margins deeply but immediately caudad the second transverse depression (of which there are three as in *stylatum*, but all more decided) causes another broad weak emargination.

Material is also in the Academy collection from Eden and Great Falls, Nicaragua and Cachi, Costa Rica.

**Microcentrum californicum** new species (Pl. XX, figs. 3 and 4; pl. XXI, figs. 13 and 14)

This insect might be mistaken for *retinerve* (Burmeister), the general structure, concave cephalic margin[45] of the pronotum and tegminal contour being similar.

It is quickly distinguished, however, by the much broader fastigium which is not sulcate, the male with much shorter stridulating vein, more elongate and slender cerci with simple enlarged apices bearing a minute tooth, subgenital plate more broadly emarginate at apex with much smaller styles and female with decidedly larger though similarly shaped ovipositor.

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[45] Faint traces of median production of this margin are sometimes found in individuals of this species and *stylatum*, but never in *retinerve*.

*Type.*—♂; Campo, San Diego County, California. September 13, 1922. (M. Hebard.) [Hebard Collection, Type No. 1199.]

Size small, form slightly less robust than in *simplex*, slightly more robust than in *suave*. Head with lateral ocelli large, vertex convex-declivent, flattened, broader than long, distinctly wider than twice proximal width. Pronotum smooth, disk without transverse depressions, sulci weak but distinct, lateral margins of disk strongly rounded except cephalad of the point where they are cut by the principal sulcus. Lateral lobes and humeral sinus of pronotum as in *simplex*. Tegmina widest just before apex of stridulating field, in which the stridulating vein is neither elongate or sulcate (but is sulcate in the Baja California males), shaped more as in *suave*, much narrower than in *simplex* and *stylatum*. Tegmina with median vein sinuous with first branch moderately angulate, connected with ulnar vein at angulation by a short transverse vein; veins at costal margin not thickened. Wings, ultimate tergite and limb armament as described for *simplex*. Supra-anal plate triangularly shield-shaped with rounded apex, almost as broad as long. Cerci very elongate, cylindrical, very slender, tapering slightly and curved inward with apices slightly thickened and armed at their extremities with a very minute, acute tooth. Subgenital plate with lateral, weakly convergent, broadly rounded carinae which are feebly produced distad and are surmounted by small tapering styles less than three (individually varying from over two and one-half to under four) times as long as broad; plate with a fine medio-longitudinal carina; interval between the styles (normally) triangular (in paratype only, rounded trapezoidal), wider than (varying from slightly narrower to as wide as) the length of one of the styles.[46]

*Allotype.*—♀; San Pedro Martyr Mountains, Baja California Mexico. [Hebard Cln.].

Much larger and more robust than type but otherwise very similar.[47] Tegmina proportionately broader. Ovipositor very large for the genus and not suddenly bent proximad as is usual, curved moderately dorsad; dorsal valves broadly convex distad and armed in distal two-fifths with minute teeth; ventral valves more strongly convex distad so that the short distal margin is transverse, that portion alone sharply toothed. Subgenital plate small, triangular.

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[46] In *californicum* there is more individual variation in the length of the styles and width and form of the intervening area than in any other Mexican species of the genus. It will also be noted that unusual size variation is found in *californicum*.

[47] Baja Californian males are considerably larger than those from southern California.

General coloration light green (body and most of limbs faded to buffy in dried specimens). Tegmina with minute intervals between veinlets toward sutural margin black but very inconspicuous; stridulating field from near base to and including stridulating vein brown, this heavier at base of stridulating vein and blackish at its apex. Tympanal area of cephalic tibiae with dorsal surface heavily suffused with brown in Californian specimens, this absent or weakly indicated in those from Baja California.

| | Length of body | Length of pronotum | Length of tegmen | Greatest width of tegmen | Length of caudal femur | Length of ovipositor |
|---|---|---|---|---|---|---|
| ♂ | | | | | | |
| Campo, California. *Type.* | 21.4[48] | 5 | 34 | 9.1 | 16.7 | — |
| Campo, California. *Paratype.* | 22.1[48] | 5.1 | 33 | 8.8 | 17 | — |
| San Pedro Martyr Mountains, Baja California. | 20.3 | 6 | 38.8 | 11.8 | 20 | — |
| San Pedro Martyr Mountains, Baja California. | 21.5 | 6 | 40 | 10.9 | 20.2 | — |
| San José del Cabo, Baja California. | 20 | 6.1 | 38.8 | 10.4 | 18.3 | — |
| ♀ | | | | | | |
| San Pedro Martyr Mountains, Baja California. *Allotype.* | 28 | 6.8 | 42 | 13.3 | 22 | 8 |

*Specimens Examined.*—9; 8 males and 1 female.

Campo, San Diego County, California, 2400 feet, IX, 13, 1922, (M. Hebard), 2 ♂, *type* and *paratype*, [Hebard Cln.]. San Pedro Martyr Mountains, Baja California, 2 ♂, 1 ♀ *allotype*, [Hebard Cln.]. Magdalena Bay, Baja California, (W. N. Lockington), 1 ♂, [A. N. S. P.]. San José del Cabo, Baja California, 2 ♂, [Hebard Cln.]. Baja California, 1895, (L. Diguet), 1 ♂, [Paris Mus.].

The Campo specimens were attracted to light at night. The following notes were made. "This is the species one or two of which were heard after dark in the tops of great oaks. The note is a frequently repeated *dsippp,* given at intervals of about a second and by no means as loud as the single note of *rhombifolium* (two colonies of which were heard in the willows along a nearby creek)."

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[48] Body filled with cotton, not shrunken as is usually the case.

**Microcentrum concisum** Brunner

San Isabel, Chiapas, 800 meters, XI, 16, 1930, 1 ♂, [Hebard Cln.].

This species, described from Colombia, is represented by Central American material before us. The above locality is on the Pacific slope of the Sierra Madre near the Guatemala border in extreme southwestern Mexico.

**Petaloptera zendala** (Saussure)

Comparison of the type of *confusa* Rehn, 1902, from Teocelo, Vera Cruz, with the present series, convinces us of its synonymy. The fastigium of this insect tapers distad and is there narrowly bilobate; that section is apparently soft in life and a number of the specimens before us have it pressed in and so appearing truncate.

Rehn's 1901 records of this species and Brunner's *filia* (if the latter is valid) from Cuernavaca, Morelos, are correct.

Cordoba, Vera Cruz, V, 14, 1908, 1 ♂, 1 ♀, *topotypes*, [Hebard Cln.]. Jalapa, Vera Cruz, VI, 1, 1894, (C. L. Smith), 1 ♂, 2 ♀, [Hebard Cln.].

**Syntechna tarasca** (Saussure)

We placed *caudelli* Rehn, described from Orizaba, Vera Cruz, as a synonym in 1924.

Guadalajara, Jalisco, 1900, (L. Diguet), 1 ♀ [Hebard Cln.]. Medellin, Vera Cruz, (T. Heyde), 1 ♀, [Hebard Cln.]. Jalapa, Vera Crua, VI, 1, 1894, (C. L. Smith), 2 ♀, [Hebard Cln.]. Zacapoaxtla, Puebla, 1904, (L. Diguet), 1 ♀, [Paris Mus.].

**Philophyllia guttulata** Stål

Medellin, Vera Cruz, (T. Heyde), 1 ♂, [Hebard Cln.]. Chichen Itza, Yucatan, (E. Thompson), 1 ♂, 1 ♀, [Field Mus.].

## PSEUDOPHYLLINAE

**Orpacophora variegata** (Brunner)

Mexico, 1 ♀, [A. N. S. P.].

This genus, erected by Kirby in 1906, includes the Mexican species referred by Brunner and Saussure and Pictet to *Acanthodis*.

**Lichenochrus brevistylus** Saussure and Pictet

Necaxa, Puebla, VII, 1926, (H. B. Baker), 1 ♀, [A. N. S. P.].

This is the first adult female to be recorded. The ovipositor, beyond the moderately swollen proximal portion, is directed feebly dorsad, the dorsal margin almost straight and very finely toothed to the acute apex, the ventral margin very broadly convex and smooth.

Length of body 24.7, length of pronotum 7.2, length of tegmen 29, length of cephalic femur 9.6, length of caudal femur 20, length of ovipositor 16.3, width of ovipositor just before end of enlarged basal portion 2.8 mm.

**Apoballa errabunda** Brunner

Near Santa Lucrecia, Vera Cruz, XI, 9, 1930, (on light in the train), 1 ♂, [Hebard Cln.].

Resembling *Syntechna* in form, this insect is quickly distinguished by the terete dorsal surfaces of the cephalic and median tibiae, the sigmoid male cerci and the stridulating area of the male tegmina which is blackish brown with a very large buffy median area including all of the stridulating veins

**Lichenochrus nigrifrons** Saussure and Pictet

Jalapa, Vera Cruz, VII, 1894, 1 juv. ♂, [Hebard Cln.]. Headwaters of Usumacinta River, Chiapas, (R. M. Walker), 1 ♂, 1 juv. ♂, [U. S. N. M. and Hebard Cln.].

This, the first adult male to be recorded, has limb armament and genitalia as described for *brevistylus.* It is possible that it represents only a color phase of that species in which the face is darkened.[49]

Length of body 32.5, length of pronotum 8.2, length of tegmen 32.8, length of cephalic femur 13.1, length of caudal femur 23.8, length of cercus 3.2, length of style 1.6 mm.

**Gongrocnemis mutica** Brunner

Probably from Mexico; taken from greenhouse at New Brunswick, New Jersey, 1 ♂, [Hebard Cln.].

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[49] Such we know to occur in certain Pseudophyllids and the fact that the present immatures have the face solidly dark but the adult has this area dark with large central area much paler, strongly indicates that such is here the case.

The solidly dark wings of *mutica* show that Kirby was incorrect in supposing that name to be a synonym of *circumdata* (Walker).

**Gongrocnemis incerta** Brunner

Cuernavaca, Morelos, X, 19, 1902, 1 ♀, [Hebard Cln.].

This pale specimen apparently agrees closely with the originally described material except that the face is not at all darkened.

**Gongrocnemis pallidespinosa** Brunner

Sierra de Nayarit, 1897, (L. Diguet), 1 juv. ♂, [Paris Mus.].

A series of this, the genotypic species, was recorded by us from Venvidio and Rosario, Sinaloa, in 1925.

**Gongrocnemis nigrospinosa** Brunner

Orizaba, Vera Cruz, II, 1887, (L. Bruner), 2 ♂, 1 ♀, [Hebard Cln.]. Almoloyas, Oaxaca, XI, 1922, (J. J. White), 1 ♂, 5 ♀, [Hebard Cln.].

Walker's *circumdata* can not be placed definitely from the original description. The present insect may well represent that species with Brunner's name a synonym.

**Anchiptolis mexicana** (Saussure)

It is very likely that examination of the female type of *Acanthodis tolteca* Saussure, referred by Brunner and Saussure and Pictet to *Platyphyllum*, will show that name to be a synonym.

Rehn recorded males from Teocelo, Vera Cruz and an immature female from Jalapa, Vera Cruz, as *Gongrocnemis incerta* and a female from Mexico as *Cocconotus castus* (?) in 1902.

Vera Cruz, Vera Cruz, (T. Heyde), 5 ♂, 3 ♀, 1 juv. ♀, [Hebard Cln.]. Orizaba, Vera Cruz, II, 1887, (L. Bruner), 6 ♂, 1 juv. ♂, (decidedly smaller and more slender), [Hebard Cln.].

In the series of eighteen adults and four immatures before us the face is pale in all but one pair of adults (in which it is black with six pale spots) and three immatures (in which it is solidly black).

**Liparoscelis nigrispina** Stål

Kirby referred this species to *Nesoecia* Scudder in 1906, which name had been placed as a synonym of *Liparoscelis* by Brunner in 1895. That synonymy we sustained in 1920.

Merida, Yucatan, (Gaumer), 4 ♂, [Hebard Cln.].

**Liparoscelis insignis new species** (Pl. XX, figs. 5 and 6)

This handsome species is nearest *nigrispina*, differing strikingly in the trivittate pronotum and males with much larger stridulating field of the tegmina and more produced sbugenital plate with bidentate apex.

*Type.*—♂; Temax, Yucatan, Mexico. (G. F. Gaumer.) [Hebard Collection, Type No. 1202.]

Size very large for the genus, form robust, limbs short and heavy. Fastigium minute, triangular, deeply sulcate, slightly surpassing antennal scrobes; showing two coarse tubercles proximad on the lateral margins as in *nigrispina*. Face flattened and smooth. Proximal antennal joint produced dorso-internally in a small blunt tooth. Pronotum densely granose, cephalic margin convex, more produced than in *nigrispina*, sulci deep, caudal margin truncate, lateral lobes shallow. Tegmina shorter than pronotum, densely veined, stridulating field large. Limbs with armament variable, much as in *nigrispina*, ventro-internal spines of cephalic tibiae very heavy. Cerci stout, tapering with incurved apex terminating in a tooth. Subgenital plate tapering and more produced than in *nigrispina*, curving dorsad to the small apex, armed with adjacent spines directed dorsad, above and within which the narrow apical area is apparently filled with a pair of rudimentary styles.

*Allotype.*— ♀ ; Chichen-Itza, Yucatan, Mexico. (E. Thompson.) [Hebard Cln.].

Similar to male in ambisexual features. Larger. Tegmina not as long as pronotum, considerably longer than wide, oval, moderately overlapping. Supra-anal plate twice as broad as long with free margin convex. Ovipositor elongate, longer than caudal femur, tapering, curved weakly dorsad, unarmed. Subgenital plate with lateral margins convex-convergent to apex where there is a small, narrow, deep emargination.

Generally clay color marked with black as follows. All of fastigium included in and occiput with a broad medio-longitudinal line flanked (except in one specimen) by short narrower lines not reaching caudal portion, eye with several such short lines radiating from it; all interantennal area and ventral margins of antennal sockets; clypeal suture broadly (except mesad in one specimen which lacks also the lateral markings) with a vertical broad band at each extremity extending dorsad a brief distance or continued to eye. Pronotal disk with a short line meso-cephalad, a shorter heavier marking at principal sulcus and a heavier marking mesad on caudal margin, these in two specimens fusing to form a percurrent medio-longitudinal line; laterad with a percurrent line broadening cephalad but more extensively caudad and filling the small non-granose area on each side of the mesozona (extending to suffuse the adjacent area to the principal sulcus only in the type). Limbs strongly flecked with blackish brown as in *nigrispina*, the solidly blackish brown of the internal and dorsal surfaces of the cephalic tibiae often even more pronounced. Spines black.

| | Length of body | Length of pronotum | Caudal width of pronotal disk | Length of tegmen | Length of caudal femur | Length of ovipositor |
|---|---|---|---|---|---|---|
| ♂ | | | | | | |
| Temax, Yucatan. *Type.* | 37 | 11.1 | 7.2 | 10 | 20 | — |
| Chichen Itza, Yucatan. *Paratype.* | 39.5 | 11.5 | 9 | 9.5 | 20.8 | — |
| ♀ | | | | | | |
| Chichen Itza, Yucatan. *Allotype.* | 45.5 | 12.3 | 9.4 | 11.8 | 23.8 | 28.3 |
| Chichen Itza, Yucatan. *Paratype.* | 41 | 11 | 8.8 | 10.1 | 22.4 | 25.5 |

A pair of paratypes, bearing the same data as the allotype, belong to the Museum of Comparative Zoology.

This is a species preferring an arid environment. It is a very powerful insect and is probably carnivorous.

**Cocconotus castus** Brunner

Vera Cruz, Vera Cruz, (T. Heyde), 3 ♂, 1 ♀, 1 large juv. ♀, [Hebard Cln.].

### *Group Pterochrozae*

Vignon has recently monographed this group,[60] there listing five Mexican species of which *ingens* Vignon, *hoegei* (Saussure and Pictet), *manista* Vignon and *maculatopennis* (Brunner) are referred to *Anommatoptera* Vignon, while *stigmatica* Karny is assigned to *Mimetica.*

All five are in our opinion valid, but *manifesta* Vignon 1923, genotype of *Anommatoptera,* based on a Mexican male is a synonym of *maculifolia* (Berlese) based on a Central American specimen which had been figured in color by Millot. Berlese gives an excellent reproduction in black crediting the species to "*Pterochroza maculifolia* Brunner." This Vignon considers a nomen nudum, but it is clearly a valid specific name, though it must be credited to Berlese, 1922.

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[60] Archiv. Mus. Nat. Hist. Nat., Paris, v, pp. 59 to 164, (1930).

### COPIPHORINAE

**Caulopsis cuspidata** (Scudder)

Sierra de Nayarit, 1898, (L. Diguet), 2 ♂, 5 ♀, [Paris Mus. and Hebard Cln.].

A female from T. Heyde in the author's collection is labelled "Medellin, Vera Cruz." We mentioned this specimen in 1925 and recorded a similarly labelled female of *C. microprora* at the time we described that species in 1927. We now know that all material received by L. Bruner from T. Heyde to have come from Central America, but all more definite data on that material to be questionable. Records of either of these species from Vera Cruz are therefore open to question, and material from southeastern Mexico must be secured to determine even the presence of the genus in that region. The locality for Scudder's *C. acutulus* also remains very uncertain, it certainly did not come from "California" proper.[51] The furthest north definite locality for *cuspidata* is Venvidio, Sinaloa, and the genus probably occurs little north of that point.

### NEOCONOCEPHALUS Karny. 1907

The confusion in this genus and its allies has in the past been enormous. This is particularly true for material from the subtropical and tropical portions of North America.

We now have sufficient series to show that instead of a great number of species being present in Mexico, only a few actually occur in this country. In fact only three very widespread species of *Neoconocephalus* and one of *Homorocoryphus* are all that can be reported from here with assurance.

The confusion found in the Biologia, Saussure and Pictet, 1898, was mainly caused by Redtenbacher in his monograph of 1891, who instead of clearing up the numerous synonymy which already existed, added to it greatly by describing again and again color phases or other individual variations as distinct species. It is noteworthy that Karny in his revision of 1907 failed as signally to clear up most of the existing errors, but recognized that although he had in his material many new species from South America,[52] none from Mexico were represented.

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[51] See Rehn and Hebard; Trans. Amer. Ent. Soc., XL, p. 366, (1915).

[52] The problem for South America is much more involved, as there a multitude of species of *Neoconocephalus* is undoubtedly present.

**Neoconocephalus triops** (Linnaeus)

Rehn and Hebard placed *mexicanus*, *fuscostriatus*, *hebes* and *tibialis* in synonymy in 1915. As we noted in 1925 Mexican records of *obscurellus*, *nieti* and probably of *macropterus* were also based on material of *triops*.

Though the description is insufficient, we now believe that *Conocephalus nieti* Saussure, based on a female from "Mexico" in 1859, is also a synonym of *triops*. The narrowness of the cleft between the vertex and frontal costa is probably attributable to individual variation. Due to that feature in the description Rehn and Hebard in 1915 suggested that a species of *Homorocoryphus* might be represented.

Redtenbachers *Conocephalus necessarius*, based on a female from "Mexico" in 1891, is very probably another synonym. Though the ovipositor is very short for the species (length of caudal femur 26, length of ovipositor 20), we have specimens of *triops* which show marked approach to these proportions (Beaumont, Texas; length of caudal femur 24.4, length of ovipositor 20.9 mm.). In *triops* the ovipositor usually averages slightly shorter than, and is rarely slightly longer than, the caudal femur.

Eight males and twenty-six females, of which six males and seven females are brown, the others green, are from: Tampico, Tamaulipas; Valles, San Luis Potosi; Jalapa, San Rafael, Medellin and Cordoba, Vera Cruz; Merida, Yucatan; San José del Cabo, Baja California; Guadalajara, Jalisco; Sierra de Tlalpujahua near Toluca, Mexico; Zitacuaro, Michoacan; Union Hidalgo, Oaxaca.

**Neoconocephalus maxillosus** (Fabricius)

The specimen reported as *testaceus* from Jalisco by Saussure and Pictet in 1898 probably represents this species.

San Rafael, Vera Cruz, (C. H. T. Townsend), 1 ♀ (green), [Hebard Cln.]. Tepic, Nayarit, 1 ♀, [Hebard Cln.].

These are northern limits for this common species, known also from Jamaica south to the Amazon.

**Neoconocephalus affinis affinis** (Beauvois)

1898. *Conocephalus aztecus* Saussure et Pictet, Biol. Cent.-Am., Orth., I, p. 391.

We here select as type locality for *Conocephalus aztecus* Saussure and Pictet, Teapa, Tabasco. Described in 1898, we are convinced from the description and study of large series of this common insect that that name is a synonym. The fastigium in this species varies from rounded truncate to subconic and *aztecus* was based on material of the former type. It was also recorded as *guttatus* by Saussure and Pictet in 1898, a name placed by us in the present synonymy in 1927 at which time we separated the insect from *maxillosus* with which it had been confused.

Queretaro, Queretaro, XI, 1887, (L. Bruner), 1 ♀ (green), [Hebard Cln.].

The above is a northern limit for the race, known from Cuba and Jamaica south to northern South America.

**Homorocoryphus prasinus** (Redtenbacher)

Placed in *Conocephalus* by Redtenbacher and Saussure and Pictet, this species was referred to the present genus when it was erected by Karny in 1907.

This name, based on males from "Mexico" may prove to be a synonym of Redtenbacher's *Conocephalus gladiator*, based on a female from "Mexico." The fastigium of the latter is so described, however, that *gladiator* would be referred to *Neoconocephalus*.[53] Study of the type can alone clarify this situation.

Vera Cruz, Vera Cruz, (T. Heyde), 5 ♂, 2 ♀ (two males and one female green, others brown), [Hebard Cln. and Acad. Nat. Sci. Phila.]. Medellin, Vera Cruz, (T. Heyde), 1 ♀ (brown), [Hebard Cln.].

As we have noted elsewhere it is unsafe to assume for the Heyde material anything more definite than "Central America." Additional material is, therefore, necessary to prove the presence of this species in the State of Vera Cruz.

The measurements are: length of tegmen ♂ 31.2 to 34.4, ♀ 26.8 to 34.5; length of caudal femur ♂ 22.8 to 24, ♀ 23 to 29; length of ovipositor 32.2 to 38 mm.

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[53] If such proves to be so, *gladiator* would probably fall as a synonym of *retusus* (Scudder). That species is peculiar to the southeastern United States, so if that is the case it must have been labelled "Mexico" in error. Unfortunately mistakes in labelling in the older European collections are undoubtedly considerably more numerous than has been supposed.

**Pyrgocorypha hamata** (Scudder)

Large series show that the species increases decidedly in heaviness and size southward in its distribution, and it is evident that *affinis* Karny, 1907, was based on merely a small female from "Mexico." The pale mandibles of the type may indicate that the specimen was teneral, as in twenty four individuals before us they are black.

A large series was recorded from Cuernavaca, Morelos, by Rehn in 1901.

Sierra de Nayarit, 1897, (L. Diguet), 1 ♂ (brown), [Hebard Cln.]. Guadalajara, Jalisco, 1897 and 1900, (L. Diguet), 1 ♂, 1 ♀ (brown), [Paris Mus.], (D. L. Crawford), 1 ♀ (green), [Acad. Nat. Sci. Phila.]; Almoloyas, Oaxaca, XI, 1922, (J. J. White), 1 ♂ (brown), [Hebard Cln.].

The range in size is shown by the following measurements, in millimeters.

| ♂ | Length of tegmen | Length of caudal femur | Length of ovipositor |
|---|---|---|---|
| Guadalajara, Mexico. | 35.2 | 14 | —— |
| Cuernavaca, Mexico. | 36.3 | 14.8 | —— |
| Almoloyas, Mexico. | 41 | 17.8 | —— |
| San Jose, Costa Rica. | 40.8 | 17 | —— |
| San Jose, Costa Rica. | 48 | 19.8 | —— |
| ♀ | | | |
| Sierra de Nayarit, Mexico. | 40.4 | 17.7 | 19.4 |
| Cuernavaca, Mexico. | 37.3 | 16 | 17.1 |
| Cuernavaca, Mexico. | 42.7 | 17.3 | 18.8 |
| Guatel, Costa Rica. | 46.8 | 21.2 | 22.8 |
| San Jose, Costa Rica. | 47 | 20.1 | 23.5 |

**Pyrgocorypha uncinata** (Harris)

Jalapa, Vera Cruz, VI, 1899, (C. L. Smith), 4 ♀ (light brown), [Hebard Cln.]. Medellin, Vera Cruz, (T. Heyde), 1 ♀ (brown), [Hebard Cln.]. Tehuacan, Puebla, 1903, (L. Diguet), 1 juv. ♀, [Paris Mus.]. Merida, Yucatan, (Gaumer), 1 ♂, 5 ♀ (brown), [Hebard Cln.].

**Pyrgocorypha sallei** (Saussure)

Coatepec, Vera Cruz, V to VI, 1922, (Conradt), 1 ♂, [Hebard Cln.]. Jalapa, Vera Cruz, IV, 1898 and VI, 1, 1894, (C. L. Smith), 3 ♀, [Hebard Cln.]; 4400 feet, X, 12, 1906, (P. P. Calvert), 2 ♂, [Acad. Nat. Sci. Phila. and Mex. Govt.].

**Erioloides mexicanum** (Saussure)

Originally referred to *Copiphora*, this species was later placed in *Eriolus* and was transferred to the present genus by Hebard at the time *Erioloides* was described in 1926.

In 1902 Rehn recorded material from Cordoba and Teocelo, Vera Cruz.

**Monchecha pretiosa** Walker

This insect, described from Oaxaca, Mexico (type) and Honduras, is widely distinct from the South American *bisulca* (St. Fargeot and Serville) though placed as a synonym of that species by Saussure and Pictet who referred it to *Exocephala*, a preoccupied generic name.

Southern Mexico, 1 ♀, [Hebard Cln.].

## CONOCEPHALINAE

**Orchelimum unispina** (Saussure and Pictet)

Originally referred to *Xiphidium*, Rehn and Hebard in 1915 placed this species in the present genus. It has been reported from the States of Baja California, Sonora, Sinaloa, Jalisco and Vera Cruz.

Sierra de Nayarit, 1898, (L. Diguet), 1 ♀, [Paris Mus.]. El Dorado, Sinaloa, XII, 23, 1928, (A. Dampf; grass in sugar cane), 1 ♀, [Hebard Cln.].

**Orchelimum fraternum** Rehn and Hebard

Described in 1915 from Guadalajara, Jalisco, comparison of the type with larger series of *unispina* now available shows that species to have usually just as distinct a weak humeral sinus on the pronotal lateral lobes. Thus it is evidently even more closely related to *unispina* than we had supposed, distinguishable only by the broader and more compact build, broader pronotal lateral lobes and male cerci which taper evenly and less suddenly from their enlarged median portion to their apices.

Though in general appearance *unispina* is very like species of *Conocephalus*, *fraternum* is instantly recognizable as an *Orchelimum.*

**Conocephalus cinereus** Thunberg

Tampico, Tamaulipas, XII, 1906 and XII, 27, 1908, 3 ♂, 6 ♀, 1 juv., [Illinois State and Hebard Clns.]. Vera Cruz, Vera Cruz, I, 15 and 16, 1927, 3 ♂, 2 ♀ (one male macropterous, others with organs of flight considerably reduced), [Mex. Govt.]; X, 14, 1926, (A. Dampf), 1 ♂, 2 ♀ (one female macropterous, others with organs of flight considerably reduced), [Mex. Govt. and Hebard Clns.]. Cordoba, Vera Cruz, XII, 2, 1925, (A. Dampf; "Manzanillo," on lawn), 8 ♂, 1 ♀ (organs of flight considerably reduced), [Mex. Govt. and Hebard Clns.]. Santa Lucrecia, Vera Cruz, X, 1922, (J. J. White), 1 ♂, [Hebard Cln.]. Colima, Colima, I, 27, 1930, (A. Dampf), 1 ♂ (macropterous), [Hebard Cln.].

In the West we have recorded this species as far north as Mazatlan, Sinaloa.

Saussure and Pictet's Mexican records of *fasciatus* are all referable to this insect which was not distinguished from that species in 1898 and Rehn and Hebard's record of *fasciatus* from Vera Cruz is correct but we believe that the specimen had been mislabelled.

We would not credit *fasciatus* to the Mexican fauna except on the grounds that it is sure to be found on the northeastern border of the country.

### **Conocephalus ictus** (Scudder)

In 1915 Rehn and Hebard synonymized *Xiphidium mexicanum* and reported material from the States of Baja California, Nayarit, Morelos, Vera Cruz and Chiapas, while in 1925 Hebard recorded a series from localities in Sinaloa. The species was previously known from Oaxaca and Tabasco.

Between Coscomatepec and Tomatlan, Vera Cruz, 1500 meters, XI, 30, 1924, 2 ♂, [Hebard Cln.]. Cordoba, Vera Cruz, X, 12, 1924 and XII, 16, 1925, 2 ♂ (very small), 1 ♀, [Mex. Govt. and Hebard Cln.]; XII, 25, 1925, (A. Dampf; Pena Blanca, hill at 1200 meters), 1 ♂, [Mex. Govt.]. Santa Lucrecia, Vera Cruz, X, 1922, (J. J. White), 5 ♀, [Hebard Cln.]. El Dorado, Sinaloa, XII, 23, 1928, (A. Dampf; grass in sugar cane), 1 ♂, [Mex. Govt.]. Almoloyas, Oaxaca, XII, 1922, (J. J. White), 1 ♀, [Hebard Cln.].

### **Conocephalus spinosus** (Morse)

Rehn and Hebard placed this species, originally referred to the synonymic generic name *Xiphidium*, in *Conocephalus* in 1915 and recorded a series from San José del Cabo, Baja California. The insect is peculiar to the salt marshes of the Pacific Coast.

**Conocephalus leptopterus** Rehn and Hebard

This very unusual species was described from a female from Tepic, Nayarit, in 1915.

Sierra de Nayarit, 1897, (L. Diguet), 1 ♀, [Paris Mus.].

Collecting will certainly add a number of species of *Conocephalus* Thunberg to the Mexican fauna. In 1915 Rehn and Hebard noted that *fasciatus fasciatus*, *fasciatus vicinus*, *resacensis* and *strictus* were certainly present in northern Mexico and very possibly *hygrophilus* and *spartinae.*

From the original description of *Xiphidium resinum* Saussure and Pictet, from Orizaba, Mexico, the species can not be definitely placed, as noted by Rehn and Hebard in 1915. It is certainly referable to *Conocephalus* and is apparently nearest *angustifrons* (Redtenbacher), a species known no farther north than Costa Rica.

## LISTROSCELINAE

**Phlugis teres** (DeGeer)

Tampico, Tamaulipas, XII, 1906, 1 ♂, 1 ♀, recorded by Hebard in 1927, [Hebard Cln.]. Vera Cruz, Vera Cruz, I, 15, 1917, 5 ♂, 1 ♀, 1 juv. ♂, [Mex. Govt. and Hebard Cln.].

This species was recorded by Saussure and Pictet from Vera Crua and Teapa, Tabasco as *mantispa* in 1898; it is indeed *mantispa* of Redtenbacher and Karny but not of the describer Bolivar.

**Phlugis chrysopa** Bolivar

In 1927 we placed *mexicanus* and *infirmus* of Saussure and Pictet as synonyms. Those author's record of *virens* (an unidentifyable name) from Cordoba, Vera Cruz, is also referable to this species.

Vera Cruz, Vera Cruz, (T. Heyde), 1 ♂, 1 ♀, 1 juv., [Hebard Cln.]. San Rafael, Vera Cruz, (C. H. T. Townsend), 2 ♀, [Hebard Cln.]. Isthmus of Tehuantepec, 1922, (Conradt), 1 ♀, [Mex. Govt.]. Tepic, Nayarit, 1 ♀, 5 juv., [Hebard Cln.].

### DECTICINAE

The degree to which field work is needed in northern Mexico is well illustrated in this Subfamily.

The following species will unquestionably be found there, although as yet unknown from Mexico. This we can state from the results of years of detailed field work in the southwestern United States, now in the main completed. *Rehnia spinosa* Caudell, *Capnobotes fuliginosus* (Thomas), *Pediodectes prattei* (Caudell), *P. tinkhami* Hebard, *P. daedalus* Rehn and Hebard, *P. bruneri* (Caudell), *Ateloplus notatus* Scudder, *A. schwarzi* Caudell, *Eremopedes bilineatus* (Thomas) and "*Cacopteris*" *aequalis* Scudder.

**Rehnia victoriae** Caudell

Described from a female from Victoria, Tamaulipas (not Guerrero) in 1907, the species is now known to have a wide range in Texas, Oklahoma and southwestern Kansas.

Monclova, Coahuila, (E. Palmer), 2 ♀, [Mus. Comp. Zool.].

**Rehnia cerberus** Rehn and Hebard

Jaral, Coahuila, XI, 1 to 3, 1909, (J. Friesser), 3 ♀, [Field Mus.].

**Rehnia sinaloae** Hebard

This species was described from a large series from Venvidio, Sinaloa, in 1920.

**Neobarrettia imperfecta** (Rehn)

Originally referred in 1900 to *Capnobotes*, Rehn proposed the genus *Neobarrettia*[54] in 1901.

Rio Cocula, Guerrero, VIII, 1898, (O. W. Barrett), 1 ♂, topotype, [Hebard Cln.]. Iguala, Guerrero, IX, 1898, (O. W. Barrett), 1 ♂, [Hebard Cln.].

**Pediodectes** sp.

La Buena Ventura, Vera Cruz, 1909, 1 ♀, [A. M. N. H.].

This insect is either a race of *bruneri* or a related species in which the caudal femora are heavy, without markings except that their apices are moderately suffused. A male is needed to determine its status.

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[54] Ent. News, xii, p. 16.

**Pediodectes grandis (Rehn)**

This species was originally referred to *Stipator* in 1904, *Pediodectes* having been described in 1920.[55] The original series included two females from Altamira, Tamaulipas.

Rodriguez, Nuevo Leon, VI, 8, 1931, (A. Dampf), 1 ♀ (teneral), [Mex. Govt.].

This specimen has the caudal femora unusually short (25.4 mm.) with blackish apices, the ovipositor long for the species (22.7 mm.).

**" Stipator " ateloploides Caudell**

Described from a female from San José del Cabo, Baja California,[56] this species is quite possibly referable to the genus *Ateloplus*. Revisionary studies can alone solve the problem.

**Eremopedes scudderi Cockerell**

Jaral, Coahuila, XI, 1 to 3, 1909, (J. Friesser), 1 ♀ (green), [Field Mus.].

Compared with a large series from western Texas this specimen is seen to be very much larger (length of body 32.8, length of pronotum 9.2, length of caudal femur 27, length of ovipositor 25.6 mm.).

Males from southern Coahuila may show that a race or allied species is present there, but such we believe is unlikely.

**Eremopedes ephippiata (Scudder)**

Described from [the northern boundary of] Sonora and placed in *Cacopteris* in 1899, Caudell referred this species to *Eremopedes* in 1907.

Copete Mine, thirty miles East of Carbo, Sonora, (F. C. Nicholas), 2 ♀, [Am. Mus. Nat. Hist. and Hebard Cln.].

As in the previous insect, these specimens show that the optimum for the species is developed well south of the southern boundary of the United States.

The present individuals are very much larger than any in our Arizona series. Length of body 35.5 and 34.3, length of pronotum 10 and 11.1, length of caudal femur 31.8 and 33.1, length of ovipositor 23.2 and 22.3 mm.

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[55] Trans. Amer. Ent. Soc., XLVI, p. 244.

[56] Proc. U. S. Nat. Mus., XXXII, p. 350, (1907).

**Eremopedes spinosa** Hebard

This species was described from Mejia Island and Angel de la Guardia Island in the Gulf of California in 1923.[57]

**" Idionotus " subcarinatus** Caudell

The species was described from a female taken at Colonia Garcia, Chihuahua, in 1907. It is highly improbable that it belongs to *Idionotus*, a genus rich in species in the Old World but represented in the New World by a single Californian representative.

### GRYLLACRINAE

**Camptonotus affinis** Rehn

This we believe is the species a male of which labelled "Mexico" was recorded as *Neortus carolinensis* by Bruner in 1888, quoted by Saussure and Pictet in 1897 and further discussed and figured by Karny as *Camptonotus carolinensis* in 1929.[58] The fact that the specimen has four instead of three pairs of spines (not including the terminal pair) on the cephalic and median tibiae may, however, indicate that a distinct species is represented, as Karny stated. The longer subgenital plate figured by Karny and the locality particularly indicate this.

Rehn described *affinis* from a pair from "Mexico" and a female from Jalapa, Vera Cruz, in 1902. From our series of *carolinensis* it is further distinguished by the following differences in coloration.

A. Buffy brown, the dorsal surface of the abdomen suffused with dark brown in intensive males only but in all but the most recessive females; with tergites, particularly those distad, darker along caudal margins only in the most intensive females. New Jersey, Pennsylvania and southern Indiana to south-central Texas............. *carolinensis* Gerstaecker

AA. Buffy brown with margins of pronotum, mesonotum, metanotum and all abdominal tergites narrowly margined with dark brown, first abdominal tergite and dorsal surface of abdomen distad, or distal half of first abdominal tergite and fifth and sixth tergites entirely blackish brown. Vera Cruz. . *affinis* Rehn

Vicinity of Jalapa, Vera Cruz, VI, 1, 1894, 1 small juv. ♂, [Hebard Cln.].

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[57] Proc. Cal. Acad. Sci., (4), XII, p. 337, figs. 10 to 13.

[58] Ann. Naturhist. Mus. Wien, XLIII, p. 48, fig. 10.

### GRYLLACRIS Serville

Two species, both winged, are known from Mexico. Brunner's *alternans* from Puebla and his *abluta* described from Salvador and recorded by Saussure and Pictet from Atoyac, Vera Cruz and Teapa, Tabasco.

A wholly apterous new species is before us which does not agree with any of the American genera hitherto proposed. Revision may show it to represent a genus distinct from *Gryllacris*, but for the present it is best assigned there.

**Gryllacris oaxacae** new species (Pl. XXI, fig. 15)

In view of the uncertainty as to generic position now existing, we here give numerous characters which may well have generic rather than specific significance.

The uncinate processes beneath the cerci and type of specialization of the subgenital plate in the male agree best with *abluta* Brunner, *panamensis* Kirby and *picta* Brunner, material of all of which species is before us.

*Type.*—♂; Almoloyas, Oaxaca, Mexico. November, 1922. (J. J. White.) [Hebard Collection, Type No. 1207.]

Size small, form moderately stout; wholly apterous. Fastigium rounding smoothly into frontal costa, there slightly less than twice width of a proximal antennal joint. Ocelli very vaguely suggested in color. Eyes elongate, vertical, moderately protuberant. Pronotum almost quadrate in dorsal aspect, cephalic margin distinctly convex mesad, caudal margin very weakly concave emarginate; lateral lobes shallow with V-sulcation decided, ventro-caudal angles even more broadly rounded than the ventro-cephalic. No trace of vestigial tegmina but a minute acute finger projecting caudad from beneath ventro-caudal angle of pronotal lateral lobes. Ultimate tergite moderately cucullate, briefly produced between cerci with latero-caudal angles there rounded rectangulate and margin between very weakly concave. Cerci slender, tapering to acute apices, the socket into which they fit with its internal portion conically produced and terminating in a large almost straight spine, this spine bent sharply dorsad and slightly inward at its base. Subgenital plate with a large, simple straight cylindrical socketed style on each side, three times as long as wide, with width about equal to its rounded apex; between these the plate is produced with lateral margins very weakly concave convergent to a minute disto-lateral node, between which nodes the distal margin is convex, the entire ventral surface of this production strongly concave. Limbs very short. Cephalic trochanter with a slenderly conical projection on its cephalic surface. Cephalic and median femora unarmed. Caudal femora with ventral margins armed with four external and three internal small spines which gradually increase in size distad. Cephalic and median tibiae with four pairs (one internal spine is missing on one side, due apparently to malformation) of spines and a small terminal pair of spines, of which the first three pairs are slightly longer than the tibial width and the third pair slightly the longest of these; caudal tibiae armed with four and five external and four and six internal small teeth and three pairs of short spurs of which the dorsal pair is well removed from the others.

General coloration brownish buff; abdominal tergites faintly suffused with brown with caudal margins pale, this becoming more decided caudad, the ultimate tergite and that preceding it dark brown. Between the vaguely buffy ocelli on the head there is a faint brownish suffusion.

Length of body 18, length of pronotum 3.8, greatest width of pronotum 3.9, length of caudal femur 9.3, greatest width of caudal femur 2.8 mm.

## STENOPELMATINAE

### STENOPELMATUS Burmeister

Including species which showed decided individual variation, in some cases appearing in individuals to represent valid specific differences, the synonymy in this genus was constantly increasing when, in 1916, we found that much fewer species than had been supposed actually existed in the United States and established a numerous synonymy.

Mexican material is still not available in sufficient quantity to revise the genus properly for this region, but we are satisfied that we have now sufficient evidence to indicate several synonyms.

Unfortunately Saussure's *Stenopelmatus histrio*, described from Orizaba in 1859, with a probable synonym his *Anostosoma tolteca* described from Orizaba in 1861, and his *sallei*, clearly an immature which in the adult stage would have organs of flight, can not at present be placed.

**Stenopelmatus fuscus** Haldeman

Saussure and Pictet's *comanchus*, described from Durango in 1897, was placed by us as a synonym of this species, widespread over the western United States, in 1916.[59] Haldeman's material came from Santa Fé, New Mexico and Chihuahua and *fuscus* has also been recorded from Juarez in the latter State.

Juarez, Chihuahua, IX, 4, 1908, (D. E. Murray), 1 ♀ (large and strongly megacephalic), [Hebard Cln.].

**Stenopelmatus talpa** Burmeister

Griffini's *lessonae* and *calcaratus*, described from "Mexico" are very probably synonyms, the latter based on a megacephalic individual. The species has been recorded from Cordoba, Vera Cruz; Tuxtla, Chiapas, and Oaxaca.

Tacubaya, Distrito Federal, (O. W. Barrett), VI, 1 large juv. ♂; IX, 1 medium juv. ♂, [A. N. S. P.]. Distrito Federal, VII and VIII, 1910, 1 small juv. ♂, [U. S. N. M.]. Mexico, 1 ♂, [Hebard Cln.]; 1887, (L. Bruner), 1 large juv. ♂, [Hebard Cln.]; 1910, (Mme. Boutet), 5 ♂, 4 ♀, 3 juv. ♂, 13 juv. ♀ (mostly very large), [Paris Mus.].

**Stenopelmatus longispina** Brunner

This species has been recorded from Sonora and Mazatlan, Sinaloa, as *irregularis*, a name placed in the present synonymy in 1916.

**Stenopelmatus minor** Saussure

This species was described from [Cordoba, Vera Cruz,] Mexico and has also been reported from Guatemala.

Guanajuato, (A. Duges), 1 ♀, [U. S. N. M.]. Guerrero Mill, Hidalgo, 9000 feet, (W. M. Mann), 1 large juv. ♂, [U. S. N. M.]. Southern Mexico, 1 ♀, [Hebard Cln.]. Mexico, 1 ♀; (A. Koebele), 1 ♀, [Hebard Cln.].

**Stenopelmatus nieti** Saussure

The type of *typhlops* Rehn, a female, dried from immersion in alcohol, from Cacualtipan, Hidalgo, described in 1902 is in the Academy collection. The differences given to separate it from *nieti*, described from Cordoba, Vera Cruz, are we believe attributable to individual variation, distortion and slight inaccuracies in the figures of *nieti* published by Saussure and Pictet in 1897. We therefore place *typhlops* in the present synonymy.

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[59] Jour. N. Y. Ent. Soc., xxiv, p. 74.

**Stenopelmatus sumichrasti** Saussure

From the description it appears highly probable that this name was based on an immature male from Vera Cruz of the species described on the next page as *sartorianus*, based on an adult macropterous female from "Mexico."

From study of a large immature female and an adult female from Costa Rica, apparently representing this species, we are now able to state definitely that the condition described as *sallei* from Mexico represents not an adult, as Saussure supposed, but a large immature which when adult would have had fully developed organs of flight.

The only recognized winged species is the present, but the description of the face for *sallei* does not agree. If that description is faulty in this respect (the differences are we believe too considerable to be accounted for by individual variation), however, *sallei* would have line priority over *sumichrasti*. More material will probably clarify this problem.

**Anabropsis mexicanus** (Saussure)

Rehn in 1901 proposed *Anabropsis* for Saussure's preoccupied *Schoenobates*.

Coatepec near Jalapa, Vera Cruz, V to VI, 1922, (Conradt), 1 ♂, 1 ♀, [Hebard Cln.]. Orizaba, Vera Cruz, I, 1892, (L. Bruner), 1 small juv. ♂; XI, 1887, (L. Bruner), 1 large juv. ♂, [both Hebard Cln.]. Mexico, 1 ♂, recorded by Rehn in 1902, [A. N. S. P.].

**Anabropsis apterus** (Brunner)

Cacualtipan, Hidalgo, 1885, (from E. D. Cope), 1 medium juv. ♂, recorded as an adult male of *A. saltator* by Rehn in 1902,[60] [A. N. S. P.]. Necaxa, Puebla, VII, 1926, (H. B. Baker), 1 ♂, [A. N. S. P.]. Sierra de Pluma, Oaxaca, 1903, (L. Diguet), 1 medium juv. ♀, [Paris Mus.].

Compared with a paratypic female from Guatemala in the author's collection, the present male is seen to be much smaller with pronotal medio-longitudinal carination weaker, it measures, length of body 21, length of pronotum 6.3, length of caudal femur 19, length of caudal tibia 18 mm. These differences are probably due to the less intensely humid tropical environment in which it was taken.

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[60] A species as yet known only from Costa Rica.

Characters not previously given which distinguish this species readily from *mexicanus* are the fastigium which lacks a mediolongitudinal dark line or sulcation and the male cerci which are longer and curve inward to their almost attingent apices.

**Glaphyrosoma gracile** Brunner

Saussure and Pictet's *aztecum* is based on a female from Teapa, Tabasco, apparently inseparable from the present insect except that the cephalic tibiae are said to have a post-median spine on the dorso-internal margin. We have not seen this condition but believe that an individual of *gracile,* abnormal in this respect, is actually represented.

Jalapa, Vera Cruz, III, 22, 1899, (C. N. and M. C. Rhoads), 1 ♀, correctly recorded by Rehn in 1902, [A. N. S. P.]. Orizaba, Vera Cruz, I, 1892, (L. Bruner), 1 ♀, [Hebard Cln.]. Puebla, (H. B. Baker), 1 ♀, [A. N. S. P.].

**Glaphyrosoma mexicanum** (Saussure)

Coatepec, Vera Cruz, V, 1922, (Conradt), 1 ♀, [Hebard Cln.].

## RHAPHIDOPHORINAE

A monograph on the North American species of this subfamily by T. H. Hubbell is nearing completion. He has very kindly supplied us with his notes on the Mexican species, which we here publish.

Although there is good reason to believe that the subfamily Rhaphidophorinae is well represented in Mexico, little is known of the species which occur south of the boundary of the United States. The members of the group are mostly secretive, nocturnal insects which are seldom collected except by the use of special methods. A technic of trapping and preserving the specimens so obtained has recently been described by Hubbell in Hebard. Systematic investigation of this group in Mexican territory is much to be desired, not only in order to add to our meagre knowledge of the Mexican Rhaphidophorid fauna, but also as a basis for deciphering the phylogenetic and zoogeographic relationships of the numerous species which have already been discovered in the southwestern United States.

Eleven species assigned to five genera have been recorded from Mexico. One of these, *Daihinia mexicana* Saussure, has been referred to the Stenopelmatid genus *Glaphyrosoma.* Of the remainder, four, described by Saussure and Pictet in the Biologia Centrali-Americana, are known only from the types, located in European Museums. I have been unable to study these specimens, but B. P. Uvarov of the British Museum of Natural History and A. N. Caudell of the United States National Museum have kindly furnished sketches, notes and photographs made from the types, which have enabled me to reach certain conclusions with regard to them. I have seen practically all of the Mexican material to be found in North American collections, including the types of the species described by Scudder and Rehn.

**Pristoceuthophilus rhoadsi** Rehn

1902. *Pristoceuthophilus rhoadsi* Rehn, Trans. Am. Ent. Soc., XXIX, p. 17. [♂; Uruapan, Michoacan, Mexico.] Genotype by monotypy.

The holotype in the collection of the Academy of Natural Sciences of Philadelphia is the only specimen known; it is a male, but is immature with genitalia damaged. While evidently congeneric with the species occurring on the Pacific slope of the United States and Canada which have been referred to *Pristoceuthophilus*, the relationships of *P. rhoadsi* must remain in doubt until the adult male is discovered. Females and immatures of species of this genus are very similar. With one or two exceptions where distinctive colorational characters exist, they are all very difficult to determine.

### ARGYRTES Saussure & Pictet

Study of the holotypic female of *Ceuthophilus macropus* Rehn shows that it is a member of this genus, which hitherto has included only the genotype *A. mexicanus* S. &. P. Drawings of the subgenital plate, measurements and notes made from the unique male type of the latter have been received from Uvarov. On the basis of this additional information I am able to amplify the original description of the genus as follows.

*Argyrtes* is a member of the Ceuthophilini, more specialized than *Pristoceuthophilus*, and less so than *Ceuthophilus* in some respects. As in *Pristoceuthophilus* the male subgenital plate is furnished with styles (absent in all the higher genera of Ceuthophilini). The styles of *A. mexicanus* differ from those of species of *Pristoceuthophilus*, being short, stout, obconical projections expanding from the base to the apex, which is obliquely subtruncate, nearly circular in outline, with its surface facing meso-caudad; in *Pristoceuthophilus* the styles are small, slenderly moniliform or subcylindrical structures.

*Argyrtes* agrees with *Ceuthophilus*, *Udeopsylla*, *Daihinia*, *Daihiniodes*, *Phrixocnemis* and *Rhachocnemis* in that the claws lack the basal setae almost universally present in the Orthoptera, and which occur in *Pristoceuthophilus* and all other Rhaphidophorine genera. The ovipositor of *A. macropus* is similar to that of *Ceuthophilus*, the ventral valves being furnished with a slightly decurved distal and four aciculate subdistal ventral teeth; the dorsal valves, however, at least in this species, differ from those of any known species of *Ceuthophilus* in having the dorsal margin shallowly but distinctly excavate just proximad of the aciculate apex. In general appearance *Argyrtes* is quite Ceuthophilus-like, suggesting such a species as *C. walkeri* Hubbell.

The more important characters distinguishing the genus appear to be as follows: Tarsal claws without basal setae; caudal tarsi with proximal three segments disto-dorsally acuminate-produced, subspinose[61]; fastigium verticis moderately prominent, more or less vertically compressed; tibiae of all legs armed with a larger number of spurs than in any species of *Ceuthophilus*; ovipositor as described above; male subgenital plate furnished with specialized styles; form like that of *Ceuthophilus*.

**Argyrtes mexicana** Saussure & Pictet

1897. *Argyrtes mexicana* Saussure & Pictet, Biol. Çentr.-Amer., Orth., I, p. 303–304, pl. 15, figs. 2, 3. [♂; Amula, Guerrero, Mexico, 6000 ft.]

This species is known only from the male type in the British Museum. It should be easily recognized from the original description and figures. The male subgenital plate in ventral aspect is elongate subpentagonal, the sides strongly convergent proximad in the basal half, the distal margin broadly arcuate emarginate, the rounded disto-lateral angles furnished with distally enlarged, obliquely subtruncate, socketed styles. The distal half of the ventral surface of the caudal tibiae of the holotype is furnished with 12 to 13 small spurs along the caudal margin and 4 on the cephalic margin, in addition to the distal pair; but the exact number and arrangement of such spurs are undoubtedly subject to individual variation.

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[61] These acuminate projections of the tarsal segments suggest the condition shown by Karny to be characteristic of the Rhaphidophorini; there is, however, no close relationship between *Argyrtes* and that group, all of its affinities being very plainly with the Ceuthophilini. This may be interpreted as a case of convergent development, or as a survival of a tendency common to the ancestors of both the Rhaphidophorini and Ceuthophilini. In some species of *Pristoceuthophilus* a faint suggestion of such a condition occurs.

**Argyrtes macropus** (Rehn)

1904. *Ceuthophilus macropus* Rehn, Proc. Acad. Nat. Sci. Phil., 1904, p. 545–546. [ ♀ ; Guadalajara, Jalisco, Mexico.]

The holotypic female in the collection of the Academy of Natural Sciences of Philadelphia is the only known specimen of this species. Since it and the type of *A. mexicana* are of different sexes, it is impossible to compare them. It is possible that they may prove to be the male and female of a single species, but the distance between the localities where they were collected and slight anatomical differences which appear to exist make it probable that they are distinct.

The following notes were made from the type specimen. Fastigium verticis about as in *Ceuthophilus maculatus*, small, briefly roundly produced, projecting slightly more than dorso-internal margins of antennal sockets, with a fine impressed medio-longitudinal groove. Legs armed as follows: Cephalic femora with ventro-cephalic carina bearing a stout pre-genicular spur, the left femur with a much smaller one preceding it, ventro-caudal carina unarmed; cephalic tibiae unarmed above, with a pair of slender distal spurs, ventral margins armed with a pair of large distal spurs, followed proximad by three smaller pairs, then a larger pair, then a smaller, and last an unpaired spur on cephalic margin (left) or a pair (right). Intermediate femora armed on distal half of ventro-cephalic carina with 4 (left) or 3 (right) small stout spurs; ventro-caudal carina similarly armed and with a larger genicular spur; intermediate tibiae armed on dorso-cephalic carina with a distal and 4 (left) or 3 (right) marginal spurs, on dorso-caudal carina with 3 (left) or 2 (right) marginal spurs, on ventro-cephalic carina with 7, on ventro-caudal carina with 6 spurs. Caudal femora with a few extremely minute spinules on ventro-cephalic carina, ventro-caudal carina furnished with 8 or 9 small stout denticulations. Caudal tibiae armed dorsad with 5 pairs of triquetrous socketed spurs as long as tibial depth, rather widely separated, dorsal margins between spur bases furnished with 7 to 5 teeth, and with a row of 13 to 16 such teeth proximad of basal pair; longest disto-caudal calcar slightly surpassing disto-dorsal end of metatarsus; ventral surface furnished with a pair of minute distal spurs, followed proximad by 9 similar spurs arranged as follows—(left) 2 pairs, single spur in cephalic row, pair, two single spurs in cephalic row—(right) 4 pairs, single spine in cephalic row; these ventral spurs extend to about middle of tibia. Ventral valves of ovipositor with teeth long and slender, distal one very weakly decurved, projecting distinctly caudad, nearly straight beyond base, subdistal directed distinctly caudad but more strongly decurved, third and fourth nearly at right angles to axis, proximal smaller and distinctly retrorse, proximal three intervals nearly equal. The surface of the dorsum has the slightly iridescent sheen noticeable in some species of *Pristoceuthophilus.*

In 1897 Saussure and Pictet erected the new genus *Hemiudeopsylla* to include four species, two of which are Mexican: *H. genicularis* S. & P. from Ciudad in Durango, Mexico, indicated by the authors as the genotype; *H. platyceps* S. & P. from "Sancelito" [Sausalito, Marin Co.], California; *H. californiana* S. & P. [not *Ceuthophilus californianus* Scudder 1862] from San Rafael, [Marin Co.], California; and *H. forreriana* S. & P. from the same locality as *genicularis.* Notes and drawings made from the type specimens of *genicularis* and *forreriana* received from Mr. Uvarov, and photographs of the types of *platyceps* and *californiana* obtained by Mr. Caudell from the authorities of the Geneva Museum and loaned to me for study enable me to make the following tentative disposition of these species.

*Hemiudeopsylla platyceps* is either a synonym of or very closely allied to *Ceuthophilus californianus* Scudder. In the latter species the ventro-cephalic (and sometimes the ventro-caudal) carina of the cephalic femur is ornamented by a row of closely-spaced, rounded nodules, which are very strongly developed in robustifemoral individuals but more weakly indicated or even almost obsolete in gracilifemoral specimens. The ventro-cephalic carina also bears a short, stout pregenicular spur. So far as I have been able to determine no other species of the genus has the cephalic femur specialized in this manner; a number of closely allied species, as yet undescribed, lack the row of nodules and usually have two to several pregenicular spines instead. Unless I have confused more than one species under the name *californianus*, the presence of such specialization is sufficient to establish the identity of the species, though the converse is not true. The photograph of the male type of *platyceps* is not very clear, but I am quite sure that the ventro-cephalic carina is armed in the fashion described for *californianus*. In addition the general conformation of the insect, the form of the visible portions of the apices of the subgenital lobes, and the armature of the caudal femur and tibia agree with the characteristics of that species.

As indicated by Caudell in 1916, *Hemiudeopsylla californiana* S. &. P. is obviously a species of *Pristoceuthophilus*; the form of the ovipositor of the female type is unmistakably that of this genus. It appears probable that the species is the same as that described by Scudder in 1894 as *Ceuthophilus celatus* on the basis of immature material, and as the synonymous *Ceuthophilus henshawi* from adult specimens. The lectotype of the last (selected by Rehn and Hebard in 1912) is from the same locality as *Hemiudeopsylla californiana*, and in view of the fact that the name of the place (Sausalito) was similarly mis-spelled in both descriptions (Sancelito, Sanzalito) it is possible that the type material of both species was derived from the same source. However, two other species have been taken in the vicinity—*Pristoceuthophilus pacificus* (Thomas) and *P. salebrosus* (Scudder). I believe that *Hemiudeopsylla californiana* S. &. P. will eventually be placed in the synonymy of one of these three species, all of which have priority.

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**Hemiudeopsylla genicularis** Saussure & Pictet

1897. *Hemiudeopsylla genicularis* Saussure & Pictet, Biol. Centr.-Amer., Orth., I, p. 301. [♂; Ciudad in Durango, Mexico, 8100 ft.]

1897. *Hemiudeopsylla forreriana* Saussure & Pictet, Biol. Cent.-Amer., Orth., I, p. 302, Pl. 25, fig. 1. [Same data as last—[juv.] ♂, [juv.] ♀.]

Comparison of the original descriptions, and examination of the sketches of the type of *genicularis* and of the female cotype of *forreriana* sent me by Uvarov leave little doubt that the latter was based on immature specimens of *genicularis*. The female type of *forreriana* is evidently a late stage nymph; the description of the male subgenital plate indicates that the male type is also immature. The material of both species was taken in the same locality and at the same elevation. The form of the body, shape of the head, form of the thoracic tergites, and form and armature of the legs of the immature female type of *forreriana* agree with the corresponding features as shown in the drawing of the type of *genicularis*.

Careful study of the description and figure of the type of *genicularis* indicates that the species is very closely allied to if not actually a member of the Californianus Group of the genus *Ceuthophilus*. It agrees closely in general configuration with members of that group, and shows the characteristic shape and armature of the caudal femora. The species is no doubt distinct from any of those occurring north of the United States boundary, but until the definitive characters of the genitalia are studied it will be impossible to characterize the species adequately or to determine its actual relationships.

Although I feel quite certain that *genicularis* should be placed with the members of the Californianus Group, I have refrained from synonymizing the genus *Hemiudeopsylla* for the present. Actual study of the type in connection with the related forms would be highly desirable before doing so; and there is some doubt as to whether the Californianus Group should not be considered a subgenus of *Ceuthophilus*. I have not so regarded it, since the gap separating the relatively attenuate, slender-legged typical *Ceuthophilus* from the robust, short-legged, Udeopsylloid types of the Californianus Group appears to be bridged by a variety of intermediate conditions. However, if on further investigation this section of the genus appears distinct enough to warrant subgeneric recognition, the name *Hemiudeopsylla* should probably be used. In case this is done other groups of species included in the genus *Ceuthophilus* will also have to be given equivalent rank.

**Ceuthophilus aztecus** Saussure & Pictet

1897. *Ceuthophilus aztecus* Saussure & Pictet, Biol. Centr.-Amer., Orth., I, p. 300, pl. 14, fig. 23. [♀; Atoyac in Vera Cruz, Mexico.]

A sketch of the female type of this species received from Uvarov shows that it is a true *Ceuthophilus*. It is similar in appearance to an undescribed species which ranges from the Wichita Mts. in Oklahoma to the Davis and Chisos Mts. in the Big Bend region of Texas. However, the relationships cannot be determined from the description and figure, and even examination of the type might not suffice, as females of related species in this genus are usually very difficult to separate. Satisfactory identification of *aztecus* will probably have to await the discovery of the male sex. In the original description measurements are given for the male by error, as they include the dimensions of the ovipositor.

**Ceuthophilus variegatus** Scudder

1894. *Ceuthophilus variegatus* Scudder, Proc. Amer. Acad. Arts & Sci., xxx, p. 31. [♂, ♀; Matamoros, Tamaulipas, Mexico; Ringgold Barracks and Carrizo Springs, Texas.]

?1894. *Ceuthophilus mexicanus* Scudder, Proc. Am. Acad. Arts & Sci., xxx, p. 82. [Juv. ♂, juv. ♀; San Pedro and San Lorenzo, Coahuila, Mexico.]

In 1912 Rehn and Hebard designated the male from Matamoros as lectotype of *variegatus*, a male [immature] from San Pedro as lectotype of *mexicanus*. The type series of the latter species consists entirely of immature specimens, most of them very small. These show a conspicuous dorsal pattern of dark blotches which is almost identical with that of nymphs definitely known to be *variegatus*. This fact, together with the agreement in body proportions and details of leg armature, and considerations based on geographic distribution, leads me to believe that *Ceuthophilus mexicanus* is very probably a synonym of *variegatus*. Study of adult material collected at or near the type locality will be necessary to verify this conclusion.

*Ceuthophilus variegatus* Sc. is a large, robust species of the Pallidus Group, showing close resemblance to large southern material of *Ceuthophilus pallidus* Thomas, and also to an undescribed species of southern Texas. It is, however, distinguishable from all other species of the genus by the form of the pseudosternite, which is uniquely specialized, with three arcuate subparallel flanges extending across the dorso-caudal surface of the arch, and with notched cephalic lobe. The range of the species cannot yet be determined very accurately, but the following records are known to be correct: Glenn Spring in the Chisos Mts., Brewster Co., Texas (not previously published), Carrizo Springs, Dimmit Co., Texas; Ringgold Barracks [Riogrande], Starr Co., Texas; and Matamoros, Tamaulipas, Mexico. I have also studied females from the following localities which may represent this species, but concerning which I am not at all certain: Mesilla, Mesilla Park[62] and State College, New Mexico; Santa Rita Mts. and Tucson, Arizona. The New Mexican specimens are much more likely to be *variegatus* than those from Arizona. If *mexicanus* is actually a synonym the range is extended southwest to southern Coahuila.

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[62] Recorded by Scudder & Cockerell (1902: 56) as *Ceuthophilus ensifer* Packard.

**Ceuthophilus latipes Scudder**

1894. *Ceuthophilus latipes* Scudder, Proc. Amer. Acad. Arts & Sci., xxx, p. 95. [♂; Sierra de San Miguelito, [San Luis Potosi], Mexico.]

This is a very peculiar and distinctive species, known only from Scudder's male type in the Museum of Comparative Zoology. The eyes are unusually prominent; the fastigium verticis is strongly produced and subspinose, shaped much as in *Pristoceuthophilus*; the frons and clypeus are somewhat inflated. The subgenital plate is broadly subconical, with its sides gently convex, converging to the apex, which is divided by a narrow but open V-shaped cleft extending only a short distance into the plate. The pseudosternite is distinctive, forming a broad arch with dorso-lateral portions of the margin laminately produced, the dorsal margin between these projecting portions broadly emarginate in dorsal aspect, the thickened rim of the arch minutely spinulose throughout; in lateral aspect the projecting portions of the arch extend caudad, their dorsal edges on a level with the central emarginate portion of the rim, their caudal margins broadly rounded and sloping down ventro-cephalad toward the base of the arch; in caudal aspect they project toward the observer and their planes diverge strongly ventrad. The caudal femur is short, stout, grylloid in form, the ventral margin almost evenly convex in the proximal four-fifths, the genicular region abruptly narrowed; the ventro-cephalic carina is almost uniformly explanate throughout and armed with 26 small, stout, slightly unequal and subspinose to nodulose teeth, increasing in thickness but scarcely in length distad and there showing a tendency to coalesce; the ventro-caudal carina bears about 18 similar but somewhat sharper and more widely and irregularly spaced teeth or spinules, partially biseriate; the base of the genicular lobe on each side bears a single small tooth; the dorsal surface of the femur is furnished with a few very small, widely spaced denticles. The caudal tibia is remarkable in that the ventro-caudal margin is produced and sharply angulate, so that at the basal third of the tibia the cross-section is subrhomboidal, with the ventro-cephalic angle rounded, the dorsal angles rectangulate, the ventro-caudal angle distinctly acute; distad this ventro-caudal angulation disappears. The dorsal spurs are short and stout, scarcely longer than the tibial depth; the longest disto-caudal calcar is considerably shorter than the metatarsus.

The caudal geniculae of the type of *latipes* are unusually stout and broad, and would fit the description given by Saussure & Pictet for *genicularis*, suggesting the possibility of some relationship between the two. If such a relationship exists it must be a rather distant one, as the structure of the fastigium verticis is entirely unlike in the two species. I do not believe that the degree of inflation of the genicular lobes or the breadth of the ventral sulcus of the caudal femur should be given much weight except where it can be shown that they are constant, since it appears that these features vary individually in many species, being at a maximum in robustifemoral specimens and less pronounced in the more slender examples of the species. *Ceuthophilus latipes* appears to be an isolated type with no close relatives.

Scudder included in the type series of *Ceuthophilus arizonensis* (1894: 52–53) a female without locality data, received from Xantus, which he surmized to be from Cape St. Lucas in Lower California. I have examined this specimen and find that it represents another species than the remainder of the type series. It is in rather poor condition, and lacks the caudal legs; but the form of the ovipositor and the coloration differ from those of *arizonensis*. Comparison with other species shows that it resembles females of *Ceuthophilus lamellipes* Rehn in all respects except its smaller size. However, the insects of this genus all show rather marked size variation, and since the ovipositor and color pattern of the dorsum (which is maculate with brownish blotches on a pale ground in a manner unusual in the southwestern species) agree closely with those of *lamellipes*, it seems probable that Scudder's specimen represents either that insect or a related form. *Ceuthophilus lamellipes* is known only from a few localities in Arizona. The most likely supposition is that this female also came from the same region; if it was actually collected in Lower California it is probably an undescribed species related to *lamellipes*.

## GRYLLIDAE

### GRYLLINAE

**Gryllus assimilis Fabricius**

A single species of *Gryllus* occurs in Mexico, which has been reported from there under a number of its multitudinous synonymic names.

Two males and eleven females previously unrecorded and a very large previously studied Mexican series are before us. The former are from Coatepec, Vera Cruz; Torreon, Coahuila; Iguala, Guerrero, and Jojutla, Morelos.

## MIOGRYLLUS Saussure

In 1915 the author revised the American species of this genus, with the following results for Mexican material.

**Miogryllus convolutus** (Johannson)

Synonyms: *Gryllodes micromegas* Saussure "Mexico"; *Nemobius distinguendus* Scudder from Orizaba, Vera Cruz; *Nemobius delicatus* Scudder from San Rafael, Vera Cruz. Other localities in Vera Cruz were given for *convolutus*.

**Miogryllus verticalis** (Serville)

Vera Cruz, Cordoba, Jalapa and Orizaba, Vera Cruz, were the localities given in 1915. Cordoba, Vera Cruz, X, 17, 1924, (A. Dampf; from pasture grass), 1 ♂, 2 ♀, [Mex. Govt.].

In addition it is certain that *Miogryllus lineatus* Scudder occurs across northern Mexico, as it is known in the United States from Brownsville, Texas to San Diego, California.

**Gryllodes toltecus** Saussure

Tampico, Tamaulipas, XII, 29, 1908, (C. A. Hart; in woods), 2 ♀, [Illinois State and Hebard Cln.]. Motzorongo, Vera Cruz, II, 1893, (L. Bruner), 1 ♀, [Hebard Cln.].

**Gryllodes sigillatus** (Walker)

This ubiquitous tropical species, possibly introduced but now widespread through the tropics of America, was recorded by Saussure and Pictet as the synonym *poeyi* from Mazatlan, Sinaloa, in 1897, and correctly by Hebard from Venvidio, Mazatlan and Las Mochis, Sinaloa, in 1925.

Orizaba, Vera Cruz, I, 1892 and XI, 1887, (L. Bruner), 2 ♀, [Hebard Cln.]. San José del Cabo, Baja California, IV, 1892, (G. Eisen), 4 ♂, 6 ♀, 8 juv., [Cal. Acad. of Sci. and Hebard Cln.]. Hermosillo, Sonora, IV, 1892, (G. Eisen), 1 ♀, [Hebard Cln.]. Tepic, Nayarit, 1 juv. ♀, [Hebard Cln.]. Jojutla, Morelos, V, 1929, (J. J. White), 1 ♂, [Hebard Cln.]. Iguala, Guerrero, IX, 1898, (O. W. Barrett), 1 ♂, [Hebard Cln.].

**Anurogryllus muticus** (DeGeer)

Medellin, Vera Cruz, IX, 1895, 1 ♀ (tegmina and wings present), [Hebard Cln.]. Atoyac, Vera Cruz, XI, 1887, (L. Bruner), 1 ♀ (tegmina only present), [Hebard Cln.].

## NEMOBIINAE

### NEMOBIUS Serville

In 1913 we revised the North American species of this genus, with the following results for Mexico.

**Nemobius fasciatus socius** Scudder

Synonym: *Nemobius hastatus* Saussure, described from Mexico City.

This insect is probably widely distributed particularly through northeastern Mexico.

**Nemobius panteli** Hebard

Mescico, Mexico (previously incorrectly recorded as *mexicanus* by Scudder).

**Nemobius brasiliensis** (Walker)

Synonym: *Nemobius mellea* Scudder from San Rafael, Vera Cruz.

**Nemobius toltecus** Saussure

Synonym: *Nemobius mexicanus* Walker, described from Oaxaca.

Recorded by us from Omilteme, Guerrero.

**Nemobius bruneri** Hebard

A Texan and Mexican series referable to this species was recorded as *Nemobius cubensis mormonius* by the author in 1913. An undescribed race is probably represented.

Jalapa, Medellin, Orizaba, San Rafael and Minatitlan, Vera Cruz; Teapa, Tabasco.

**Nemobius cubensis cubensis** Saussure

Vera Cruz, Vera Cruz.

**Nemobius cubensis mormonius** Scudder

Synonym: *Nemobius comanchus* Saussure from Durango or Sinaloa.

Also reported as *cubensis* from Teapa, Tabasco, by Saussure.

Cordoba, Vera Cruz, X, 2 to XII, 7, 1924, (A. Dampf), 1 ♂, 4 ♀, 1 juv., [Mex. Govt.].

**Nemobius carolinus neomexicanus** Scudder

Reported from numerous localities in Vera Cruz and Baja California as *neomexicanus*, as the synonym *denticulatus* Saussure and from Vera Cruz and Tepic as *toltecus* of Scudder (not of Saussure), additional records were given by us when establishing its racial status in 1913 and others from Sinaloa in 1925.

Rodriguez, Nuevo Leon, VI, 6, 1931, (A. Dampf; at light), 10 ♂, 6 ♀, [Mex. Govt. and Hebard Cln.]. Near Coscomatepec, Vera Cruz, 1500 meters, XI, 30, 1924, (A. Dampf), 1 ♀, [Mex. Govt.].

The Rodriguez series, as we stated for series from Vera Cruz in 1913, is as dark as many series of *carolinus carolinus*, but the ovipositor is considerably shorter in all the females.

### PENTACENTRINAE

**Trigonidomimus belfragii** Caudell

This species was described in 1912 from Bosque County, Texas.[63] The specimen here recorded, like the type, is very pale brown, with antennal annuli barely noticeable. In 1928 we described *Quarequa annuliger* from San Antonio, Nicaragua, and four localities in Panama. That material is blackish brown with striking whitish antennal annuli, while the oblique truncation of the ultimate palpal joint extends half way to the base of that joint instead of being much shorter (as in the case in *belfragii*). In other structural features close agreement is shown in these species, which are clearly congeneric. We therefore place our *Quarequa* as a synonym of *Trigonidomimus*.

San Rafael, Vera Cruz, (C. H. T. Townsend), 1 ♀ (macropterous), [Hebard Cln.].

### PHALANGOPSINAE

**Prosthacusta circumcincta** (Scudder)

Saussure's *P. mexicana*, described from Cordoba, Vera Cruz, was shown to be a synonym of *Nemobius circumcinctus* Scudder, described from Orizaba, Vera Cruz, by us in 1928.[64]

**Niquirana? mexicana** (Saussure)

In the paper referred to above we showed that *Amusus mexicanus* Saussure, described from Teapa, Tabasco, could not be retained in that genus. It belongs to *Niquirana* Hebard or an undescribed related genus.

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[63] Proc. Ent. Soc. Washington, XIV. p. 187.

[64] Trans. Amer. Ent. Soc., LIV, p. 20.

In 1928[65] we placed *Ectecous cantans* as a synonym of *hedyphonus*, but stated that the female described as the former from Orizaba, Vera Cruz, could not be placed but that we were convinced that it represented neither that genus or species. It is quite possibly referable to the genus *Acla* Hebard, 1928.

**Paragryllus martini** Guerin

This species was recorded from Teapa, Tabasco, by Saussure and Pictet in 1897, as *temulentus*. Extensive studies in this subfamily in 1928 convinced us that *rex* Saussure described from Pernambuco, Brazil, and *temulentus* described from Brazil, are synonyms of the present species.

**Amphiacusta azteca** Saussure

Jalapa, Vera Cruz, VI, 1, 1894, 1 ♂, 4 ♀, [Hebard Cln.]; 1 ♀, [A. N. S. P.]. Orizaba, Vera Cruz, I, 1892, (L. Bruner), 1 juv. ♂, 1 juv. ♀, [Hebard Cln.]. Distrito Federal, (J. R. Inda), 1 ♂, [U. S. N. M.].

In 1928 we placed *Endacusta* Brunner as a genus peculiar to Australia and stated that Saussure's (emended) *Endacustes aztecus*, described from Teapa, Tabasco, belongs to or near *Amphiacusta*.[66] If the former is true and a valid species is represented it would therefore require a new name.

## OECANTHINAE

**Oecanthus varicornis** Walker

San Rafael, Vera Cruz, (C. H. T. Townsend), 2 ♀, [Hebard Cln.]. Tepic, Nayarit, 1 ♀, [Hebard Cln.]. Santa Isabel, Sierra Madre, Chiapas, XI, 16, 1930, (on light, in mountain forest), 1 ♀, [Hebard Cln.].

**Oecanthus niveus** (DeGeer)

Sierra el Taste, Baja California, 1 ♀, [Hebard Cln.].

**Oecanthus nigricornis aregntinus** Saussure

This race was recorded as *argentinus* from Ciudad, Durango, and Mazatlan, Sinaloa, by Saussure in 1897 and as *nigricornis* from Los Mochis and Villa Union, Sinaloa, by Hebard in 1925.

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[65] Trans. Amer. Ent. Soc., LIV, p. 92.

[66] Trans. Amer. Ent. Soc., LIV, p. 91.

Vera Cruz, Vera Cruz, IX, 21, 1924, (A. Dampf; sea shore dunes in weeds among Acacias), 2 ♀, [Mex. Govt. and Hebard Cln.]. Los Mochis, Sinaloa, V, 16, 1930, 1 ♂, 1 ♀, [Mex. Govt. and Hebard Cln.].

**Oecanthus marcosensis** Baker

San Rafael, Vera Cruz, (C. H. T. Townsend), 2 ♂, [Hebard Cln.].

This insect may prove to be a race or synonym of *californicus;* sufficient material is not at present available to decide its status.

**Oecanthus californicus** Saussure

Material of this species has been incorrectly referred to *nigricornis* from Ciudad, Durango; Chilpancingo, Guerrero at 4600 feet; Jalisco, and Temax, Yucatan.

San Pedro Martyr Mountains, Baja California, 1 ♀, [Hebard Cln.]. Tepic, Nayarit, 2 ♀, 3 juv., [Hebard Cln. and A. N. S. P.]. La Barca, Jalisco, V, 23, 1930, 1 ♂, [Hebard Cln.]. Lerdo, Durango, XI, (L. Bruner), 1 ♂, [Hebard Cln.]. Morelos, XI, (A. Koebele), 1 ♂, [Hebard Cln.]. Almoloyas, Oaxaca, XI, 1922, (J. J. White), 1 ♂, 2 ♀, [Hebard Cln.].

**Neoxabea bipunctata** (DeGeer)

Mexican material of this species was referred to *Oecanthus* by Saussure in 1897 and to *Xabea* by Rehn in 1902.

## TRIGONIDIINAE

**Anaxipha delicatula** Scudder

San Rafael, Vera Cruz, (C. H. T. Townsend), 1 ♂ (caudate), [Hebard Cln.]. San José del Cabo, Baja California, 2 ♂, 1 ♀ (male caudate, pair abbreviate), [Hebard Cln.].

These are southern limital records of this species,[67] distinguished from pale individuals of *pulicaria* only by its slightly larger size but distinctly more robust form.

**Anaxipha pulicaria** (Burmeister)

San Rafael, Vera Cruz, (C. H. T. Townsend), 1 ♂, 2 ♀ (caudate), [Hebard Cln. and A. N. S. P.]. Medellin, Vera Cruz, IX, 1895, 1 ♂, 1 ♀ (male abbreviate, female caudate), [Hebard

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[67] Recorded and figured by Rehn and Hebard as *pulicaria* (Proc. Acad. Nat. Sci. Phila., 1916, p. 303, pl. 14, fig. 20.), at which time they recorded and figured (fig. 21) that species as *vittata*. These identifications were corrected by Hebard in 1924 (Proc. Acad. Nat. Sci. Phila., LXXVI, p. 232, footnote 130).

Cln.]. Cordoba, Vera Cruz, X, 17, 1924, (A. Dampf; beaten from pasture grass), 1 ♂, 3 ♀ (abbreviate), 1 juv., [Hebard Cln.].

This insect was correctly recorded from the eastern Cordillera of Mexico [Cordoba] by Saussure in 1874, 1878 and 1897, but was incorrectly placed as a synonym of *exigua* by Kirby in 1906,[68] Rehn and Hebard pointing out this error in 1912.[69]

This diminutive species is now known to reach from Georgia to Amazonia and is apparently one of the most abundant forms of the genus in eastern Mexico.

**Anaxipha stolzmannii** (Bolivar)

In 1924 we placed *poeyi* Bolivar as a synonym of this species, unusually widespread through the American tropics.

Comparison of large series from Honduras now before us with the many we already possessed convinces us that *Cyrtoxiphus smithi* Saussure must also be synonymized. It was described from a male from Teapa, Tabasco.

**Anaxipha gracilis** (Scudder)

We placed Saussure's *Cyrtoxipha azteca*, described from Cordoba, Vera Cruz, and *C. tibialis*, described from Teapa, Tabasco, in the present synonymy in 1924.

Though no Mexican material is before us, we have a considerable series from Honduras of this widespread tropical American insect.

**Anaxipha tolteca** (Saussure)

San Rafael, Vera Cruz, (C. H. T. Townsend), 1 ♀, [Hebard Cln.].

In 1924 we placed *Cyrtoxipha angusticollis* Saussure as a synonym. Since then we have examined the types in the Geneva Museum (of *tolteca*, a female from Orizaba, Vera Cruz; of *angusticollis*, a male from the eastern Cordillera, labelled "Potrero") and find our decision to have been correct. We reported a series of *tolteca* from Venvidio, Sinaloa, in 1924.

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[68] Hence his incorrect record of *exigua* from "Mexico," though that species undoubtedly occurs in the extreme northeastern portion of the country, as we have it from Brownsville, Texas.

[69] At that time and subsequently, United States records were confused, the present species being recorded as *vittata* by Rehn and Hebard and as *pulicaria vittata* by Blatchley in 1920, while the insect recognized during that period as *pulicaria* actually represented *delicatula* (Scudder), as Hebard pointed out in 1924.

Saussure's material from Teapa, Tabasco, so recorded in 1897, represents a distinct undescribed species, of which we apparently have a large series from Honduras.

Whether much individual variation in marking occurs or several closely related species are represented in the tropical North American series before us cannot at present be determined. Saussure's *olmeca*, described from a female from Teapa, Tabasco, is probably involved.

### SYMPHYLOXIPHUS Rehn, 1906[70]

Though it is now evident that this genus is much closer to *Anaxipha* than was originally supposed, we believe that a definite unit exists, making possible the separation from the latter very large genus of a number of tropical American species.

A remarkable fact is that in some macropterous individuals the corneous convex tegmina of the female, characteristic of *Symphyloxiphus*, are not present and the type of tegmina normal in *Anaxipha* is instead shown. Such individuals would unhesitatingly be assigned to *Anaxipha* were this very exceptional individual variation not known to exist. It unquestionably adds greatly to the difficulty in studying the species of the group.

Saussure's *Cyrtoxiphus chichimecus*, described from "Mexico," cannot be generically placed without further study of the type. It may belong here, to *Phyllopalpus*, or to a widely distinct genus.

**Symphyloxiphus varians** new species (Pl. XX, figs. 7 and 8)

This species is distinguished by the brownish buff head, pronotum and limbs. The caudal femora have a longitudinal band of dark brown ventrad on their external surface, this cleft distad and above it there is some brown tessellation and marking. The male tegmina have the anal field brown, opaque and distinctly darker than the other portions except in the palest individuals. The female tegmina vary from coriaceous and shining black (normal) to delicate, transparent buffy brown (rare). Analogous variation was noted by us for *S. pictus* (Saussure) in 1928.

*Type.*—♂; Punta Gorda, British Honduras. February, 1931. (J. J. White.) [Hebard Collection, Type No. 1208.]

Very similar in size, form and general coloration to males of *Anaxipha pulicaria*, particularly distinguished by the features noted above. Size small, form medium, limbs short for the group. Head with eyes moderately prominent, large but not strongly protruding. Palpi short, fifth joint the longest, evenly and moderately expanding to the almost transverse truncate apex, where the width is slightly less than half the length of the joint. Pronotum widening caudad, its length scarcely more than one-half its caudal width. Tegmina of normal form for genus, surpassing the abdomen and of moderate width. Wings absent (sometimes present in the species[71] and then very strongly caudate). Caudal tibiae with three pairs of strongly alternating spines, the longest well exceeding the distance between their bases. Caudal metatarsus short, the longest tibial spur three-quarters its length.

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[70] Proc. U. S. Nat. Mus., xxx, p. 603.

*Allotype.*— ♀ ; same data as type. [Hebard Collection.]

Agrees closely with male except as follows. Tegmina coriaceous, not covering apex of abdomen, their convexity fitting it closely; veins well developed and regular with no adventitious veins between but with a few delicate cross-veins.[72] Ovipositor rather short and stout, curvature dorsad strongest proximad and distad, thickening weakly indicated only on dorsal margin before end of proximal two-thirds, the margins thence evenly converging to the acute apex and the dorsal margin showing no obliquity whatever, the serrulation of these margins and laterad of the ventral margin of the dorsal valves exceedingly fine. Subgenital plate bilobate with a small meso-distal cleft.

Coloration as described above. Occiput and pronotal disk (except for a fine paler medio-longitudinal line), cheeks and lateral lobes of pronotum often somewhat embrowned. Two concave lines on frontal protuberance and subocular lines often very dark brown. Caudal femora usually with a heavy pregenicular dorso-internal fleck of dark brown in addition to the other dark markings.

Length of body ♂ 5, ♀ 4.2; length including tegmen ♂ 5.2, ♀ 4.2; length including wings of caudate paratypes ♂ 9.2, ♀ 8.7; length of pronotum ♂ .88, ♀ .88; total caudal width of pronotum ♂ 1.49, ♀ 1.28; length of tegmen ♂ 3.7, ♀ 2.8 (of caudate paratypes ♂ 4.3, ♀ 3.1); width of tegminal dorsal fields ♂ 1.7; length of exposed portion of wings in caudate paratypes ♂ 3.42, ♀ 3.56; length of caudal femur ♂ 3.9, ♀ 3.8; length of longest caudal tibial spine ♂ .65, ♀ .64; length of caudal metatarsus ♂ .85, ♀ .82; length of ovipositor 1.7 mm. (by micrometer).

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[71] Auditory foramina are present on both faces of cephalic tibiae in alate specimens but are present only on caudal faces of cephalic tibiae in individuals lacking wings.

[72] In alate specimens with delicate tegmina traces of adventitious veins and heavier cross-veins are shown.

*Specimens Examined.*—36; 27 males, 8 females and 1 immature individual.

Valles, San Luis Potosi, Mexico, I, 26, 1909, 1 ♂ (much like type), [Hebard Cln.]. San Rafael, Vera Cruz, Mexico, (C. H. T Townsend), 4 ♂, 2 ♀ (two males abbreviate, others caudate, all pale except one female with tegminal dorsal fields moderately coriaceous, glabrous, shining purplish and almost black), [Hebard Cln.]. Medellin, Vera Cruz, Mexico, IX, 1895, 2 ♂, 1 ♀ (abbreviate, very pale, but female tegmina as described above), [Hebard Cln.]. Cordoba, Vera Cruz, Mexico, XI, 1887, (L. Bruner), 1 ♀ (abbreviate, very pale, tegmina diaphanous and pale), [Hebard Cln.]. Vera Cruz, Vera Cruz, Mexico, I, 14, 1927, 1 juv. ♀, [Hebard Cln.].[73]

Punta Gorda, British Honduras, II, 1931, (J. J. White), 18 ♂, 4 ♀, *type, allotype, paratypes,* (pair caudate; darker than most Mexican males, females as described above for dark condition), [Hebard Cln.]. Lancetilla, Atlantida, Honduras, VIII, 26, 1930, (J. A. G. Rehn; beaten from weed tangles), 3 ♂, 1 ♀ (abbreviate, coloration slightly paler than in type), [A. N. S. P.].

**Macroanaxipha macilenta** (Saussure)

Material from as far north as Nicaragua and Honduras is before us. Saussure's variety? *gracilis*, based on a female from Teapa, Tabasco, may represent this species or a species of *Anaxipha.* We suggested the latter as probable in 1928, but now believe it more likely that the former is the case.

In all females before us the tegmina show weak but distinct transverse veins.

### PHYLLOPALPUS Uhler.

The Mexican species of this genus were generally referred to *Phylloscirtus* (= *Phylloscyrtus*) until the author's revision in 1928.[74] The latter is now known to be a South American genus, reaching no great distance into tropical North America, and *Phylloscyrtus elegans* Guerin, described from "Mexico" was undoubtedly based on material incorrectly labelled as to locality.

Walker's Mexican *Phyllopalpus? nigrovarius* can not be placed. It is possible that a species of *Anaxipha* is represented.

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[73] This Mexican series was partly confused with *Anaxipha delicatula* by Rehn and Hebard and the markings actually peculiar to the present species are mentioned there. (Proc. Acad. Nat. Sci. Phila., 1916, p. 305, footnote 177.)

[74] Trans. Amer. Ent. Soc., LIV, p. 104.

**Phyllopalpus brunnerianus** (Saussure)

Santa Lucrecia, Vera Cruz, (F. Knab), 2 ♂, 1 ♀, [U. S. N. M. and Hebard Cln.].

**Phyllopalpus caeruleus** (Saussure)

The generic confusion which existed in 1904 led Rehn to describe *Thamnoscirtus caeruleus*, a synonym of the present species as shown by the described pair from Guadalajara, Jalisco, in the Academy collection.

Mexico, 1 ♀, [A. N. S. P.].

### ENEOPTERINAE

**Diatrypa pallidelabris** Chopard

San Rafael, Vera Cruz, (C. H. T. Townsend), 1 ♀, [Hebard Cln.].

Described from French Guiana in 1912, additional material is now before us from Nicaragua, Costa Rica, Trinidad, British Guiana, Brazil and Peru. In this species there is a broad band of brown between the eyes, the face below being paler than the general coloration.

**Diatrypa tolteca** Saussure

San Rafael, Vera Cruz, (C. H. T. Townsend), 1 ♀, [Hebard Cln.].

**Paroecanthus aztecus** Saussure

We separated this handsome species in 1925 from the Central American *P. annulatus* (Scudder) under which it had been synonymized by Kirby and recorded a female from Venvidio, Sinaloa. Additional material from Honduras further substantiates this, indeed it is decidedly nearer *mexicanus* than that species.

**Paroecanthus mexicanus** Saussure

Orizaba, Vera Cruz, I, 1892, (L. Bruner), 1 ♂, 1 ♀, [Hebard Cln.].

Northern recorded limits are Altamira, Tamaulipas (Rehn, 1904) and Venvidio, Sinaloa (Hebard, 1925).[75] Mexican series are much needed to determine the exact number of valid species of *Paroecanthus* occurring in this country.

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[75] See comments; Trans. Amer. Ent. Soc., LI, p. 309.

**Paroecanthus olmecus** Saussure

San Rafael, Vera Cruz, (C. H. T. Townsend), 2 ♀, [Hebard Cln.].

If individual variation occurs in the degree of development of the tympana of the internal face of the cephalic femora, *olmecus* would undoubtedly have to be placed as a synonym of *mexicanus*. Considerable series of the genus from tropical America before us, however, do not indicate that such is the case.

**Hapithus agitator quadratus** Scudder

San Rafael, Vera Cruz, Mexico, (C. H. T. Townsend), 1 ♂, 2 ♀, [Hebard Cln.].

**Aphonomorphus flavifrons** (Saussure)

Described from Teapa, Tabasco and referred to *Aphonus*, we have recorded the species from Panama. The genus is very widespread in tropical America. Though a very large number of species exist, individuals are not frequently encountered, probably due to their nocturnal habits and the fact that during the day they remain under bark, in dead leaves and other nooks of thorough concealment.

Unfortunately sufficient material is not available to discuss the other species of the Eneopterinae recorded from Mexico, though revision is very much needed. For instance though Saussure records *Orocharis gryllodes* and *O. saltator* from Mexico, considering the latter as possibly a synonym of the former, we know that they are widely distinct species; *gryllodes* with *saulcyi* a synonym and *saltator* probably confined to the southeastern United States. Also *Heterecous* is not only an uncertain genus but we believe that the Mexican *smithianus* Saussure is not congeneric with the genotype and very possibly a *Paroecanthus* very near *guatemalae*.

## MOGOPLISTINAE

In 1912 Rehn and Hebard revised the North American species of this subfamily.[76] Since then, however, a considerable amount of further revision has occurred.

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[76] Proc. Acad. Nat. Sci. Phila., 1912, pp. 184 to 234.

**Cycloptiloides americanus** (Saussure)

We proposed *Glaphyropus* for this genus in 1912, but later found it to be preoccupied by *Cycloptiloides* Sjostedt 1910.

Sierra Laguna, Baja California, 1 juv. ♂, [Hebard Cln.]. Cordoba, Vera Cruz, II, 18 and 29, 1908, (F. Knab), 2 ♂, [U. S. N. M. and Hebard Cln.]. Mexico, 3 ♂, 2 ♀, [Hebard Cln.].

**Cycloptilum hesperum** (Rehn and Hebard)

Originally described from localities in Baja California and referred to *Cryptoptilum*, that genus was placed as a synonym of *Cycloptilum* by Blatchley in 1920. We recorded a female from San Carlos Bay, Sonora in 1923 and another from Mazatlan, Sinaloa in 1925.

Village on Maria Madre Island, Tres Marias Islands, V, 15, 1925, (H. H. Keifer), 1 ♀, 1 juv. ♂, [Cal. Acad. of Sci. and Hebard Cln.]. Clarion Island, IV, 28 to V, 1, 1925, (H. H. Keifer), 4 ♂, 1 ♀, 1 juv. ♂, 3 juv. ♀, [Cal. Acad. of Sci. and Hebard Cln.].

The Tres Marias Islands female is small for the species. Although this insect is considerably heavier than *antillarum*, the last joint of the palpi is decidedly longer and more slender.

**Cycloptilum robustum** Hebard

Described from Venvidio, Sinaloa, in 1925, this species is conspicuously larger with palpi shorter and heavier than in *hesperum*.

**Cycloptilum erraticum** Scudder

Described from the Galapagos Islands, this species is apparently a widespread Pacific insular insect.

Village on Maria Madre Island, Tres Marias Islands, V, 15 and 22, 1925, (H. H. Keifer), 2 ♀ (antennal annuli very weak), 1 juv. ♀, [Cal. Acad. Sci. and Hebard Cln.]. Braithwaite Bay, Socorro Island, V, 6 and 7, 1925, (H. H. Keifer), 2 ♂, 1 juv. ♂, 1 juv. ♀ (antennal annuli distinct in one male, weak in one immature, very weak in one immature, almost obsolete in one male), [Cal. Acad. Sci. and Hebard Cln.].

**Cycloptilum tubulatum** (Rehn and Hebard)

This unusual species, originally assigned to the synonymous *Cryptoptilum*, is known from a single male in the author's collection, described in 1912 from Salina Cruz, Oaxaca.

**Cycloptilum distinctum Hebard**

Isabel Island, Sinaloa, V, 24, 1925, (H. H. Keifer), 1 ♀, [Hebard Cln.].

We described this species from Tia Juana, California, in 1931. It certainly occurs in northern Baja California, but the present female differs in having the palpi slightly longer and less robust and the latero-caudal angles of the subgenital plate distinctly more convex. Males and additional females may show it to represent still another species of the Squamosum Group.

**Cycloptilum mexicanum** (Saussure)

Originally referred to *Liphoplus*, the male type of this species in the British Museum from Amula, Guerrero, has been examined by us and found to have the interantennal protuberance and metatarsal armament as in *Cycloptilum*. The male tegmina are unusually developed with an exceptionally large portion of the dorsal fields exposed, but this is exaggerated by the fact that in pinning the anterior portion of the specimen has been pushed away from the caudal portion which includes the tegmina.

**Hoplosphyrum occidentale** (Scudder)

Known only from Baja California, this species was referred to *Mogoplistes* in 1869, later to *Mogisoplistus* then to *Ectatoderus* and in 1912 to *Hoplosphyrum* at the time Rehn and Hebard described that genus.

**Hoplosphyrum boreale** (Scudder)

Originally referred in 1902 to *Ectatoderus*, Rehn and Hebard assigned this insect to *Hoplosphyrum* in 1912. As noted below, more Mexican material may show it to be a race, possibly a synonym, of *aztecum* (Saussure).

San Martin Island, Baja California, VI, 8, 1925, (G. D. Hanna), 1 juv. ♂, [Cal. Acad. Sci.]. Cedros Island, Baja California, VI, 4, 1925, (G. D. Hanna), 1 small juv. ♀, [Cal. Acad. Sci.]. Tres Magdalena Island, Tres Marias Islands, V, 19, 1925, (H. H. Keifer), 1 juv. ♂, 1 juv. ♀, [Cal. Acad. Sci.].

**Hoplosphyrum aztecum** (Saussure)

Uvarov has kindly examined the type, a male from Chilpancingo, Guerrero, in the British Museum, and compared it for us with the smallest males of *boreale* (from Texas) in the large series of that species in the Philadelphia collections. It is considerably smaller with caudal metatarsus similar. The last palpal joint is not ovate as originally described but oblique distad with angles rounded as in *boreale*, but it is shorter and broader in the present insect. The blackish suffusion at the apex of the tegmina is more pronounced in *aztecum*.

Originally referred to *Ectatoderus* in 1897, the northern insect described as *E. borealis* by Scudder in 1902 may prove to be a race or even a synonym of the present insect.

## MYRMECOPHILINAE

None of these crickets, which inhabit the nests of ants, have been found in Mexico, though three of the four species found in the United States undoubtedly occur in the northern portion of this country.[77] These are *Myrmecophila oregonensis* Bruner, *M. manni* Schimmer and *M. nebrascensis* Lugger.

## GRYLLOTALPINAE

**Scapteriscus mexicanus** (Burmeister)

Durango, 1 ♀, (macropterous), [Hebard Cln.].

This specimen was discussed by Rehn and Hebard in 1916.[78]

**Gryllotalpa hexadactyla** Perty

Cordoba, Vera Cruz, X, 2, 1924, (A. Dampf; at light), 1 ♀ (macropterous), [Hebard Cln.].

A third species is known from Mexico; *Gryllotalpa intermedia* Saussure, described from Vera Cruz and Guatemala. Large series recorded from Brazil and Peru by Rehn are in the Philadelphia collections.

## TRIDACTYLINAE

**Tridactylus apicialis** Say

Saussure recorded this species from Mexico as his *incertus* and Haldeman's *mixtus*, names which were later synonymized by Scudder under *apicalis* or its synonym *terminalis*.

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[77] See revision by Hebard; Trans. Amer. Ent. Soc., XLVI, pp. 91 to 111, (1920).

[78] Proc. Acad. Nat. Sci. Phila., 1916, p. 279, footnote 137, pl. 14, figs. 12 to 15.

San Rafael, Vera Cruz, (C. H. T. Townsend), 3 ♂, 1 ♀, [Hebard Cln.]. Las Cocos, Vera Cruz, XI, 10, 1923, (A. Dampf), 1 juv., [Hebard Cln.].

**Tridactylus minutus** Scudder

Saussure recorded this insect from Mexico as his *histrionicus*, a name correctly placed as a synonym of *minutus* by Scudder.

Rio Mante, Tamaulipas, VIII, 8, 1930, (A. Dampf), 1 ♂ (caudate), [Hebard Cln.]. Orizaba, Vera Cruz, I, 1892, (L. Bruner), 18 ♂, 18 ♀ (all caudate), 9 juv., [Hebard Cln. and Mex. Govt.]. Balsas, Guerrero, VII, 12, 1898, 2 ♂ (caudate), [Hebard Cln.].

### RIPIPTERYGINAE

**Ripipteryx pulicaria** Saussure

Las Cocos, Vera Cruz, XI, 10, 1923, (A. Dampf), 3 ♀ (antennae pale mesad), [Hebard Cln.]. Orizaba, Vera Cruz, I, 1892, (L. Bruner), 9 ♂, 12 ♀ (antennae dark, last joint slightly paler in some), [Hebard Cln. and Mex. Govt.]. Balsas, Guerrero, VII, 12, 1898, (O. W. Barrett), 1 ♂, [Hebard Cln.].

Two male paratypes from Teapa, Tabasco, are in the author's collection.

**Ripipteryx fraterna** Saussure

This insect, Saussure's *mexicana* and his *tricolor*, also recorded from Mexico, we believe represent distinct species and not color phases as Saussure supposed.

Orizaba, Vera Cruz, I, 1892, (L. Bruner), 5 ♂, 6 ♀, [Hebard Cln.]. Vera Cruz, Vera Cruz, (T. Heyde), 1 ♀, [Hebard Cln.].

A paratypic pair from Atoyac, Vera Cruz, is also in the author's collection.

**Ripipteryx scrofulosa** Saussure

Guadalajara, Jalisco, 1903, (L. Diguet), 1 ♂, [Hebard Cln.].

Unlike the type, this specimen has a medio-longitudinal line, yellow buff like the pronotal margins, in the cephalic half of the pronotal disk. This rather suggests *saltator* but the pale band of the face shows no structural specialization. There are evidently a number of species of *Ripipteryx* present in Central America, but without series we would not consider ourselves warranted in considering the present specimen distinct from *scrofulosa*.

## EXPLANATION OF PLATES

### PLATE XVII

Fig. 1. *Heteronemia oaxacae* new species. Dorsal view of dextral male cercus. *Type.* Almoloyas, Oaxaca, Mexico. (Greatly enlarged.)

Fig. 2. *Heteronemia oaxacae* new species. Lateral view of male poculum. *Type.* Almoloyas, Oaxaca, Mexico. (Much enlarged.)

Fig. 3. *Heteronemia oaxacae* new species. Lateral view of female head. *Allotype.* Almoloyas, Oaxaca, Mexico. (× 6.)

Fig. 4. *Crimisodes undulatum* new species. Dorsal view of male head. *Type.* Cordoba, Vera Cruz, Mexico. (Much enlarged.)

Fig. 5. *Crimisodes undulatum* new species. Lateral view of male. *Type.* Cordoba, Vera Cruz, Mexico. (× 8.)

Fig. 6. *Tettigidea spicatoides* new species. Dorsal view of female. *Type.* La Forestal, Vera Cruz, Mexico. (× 3¾.)

Fig. 7. *Oaxacella whitei* new species. Lateral view of female. *Type.* Almoloyas, Oaxaca, Mexico. (× 2.)

Fig. 8. *Morseiella rufipes* new species. Lateral view of male. *Type.* Morelos, Mexico. (× 2.)

Fig. 9. *Morseiella dampfi* new species. Lateral view of male. *Type.* San Geronimo, Oaxaca, Mexico. (× 2.)

Fig. 10. *Lactista humilis* new species. Dorsal view of female. *Allotype.* Cuernavaca, Morelos, Mexico. (× 2.)

### PLATE XVIII

Fig. 1. *Platylactista micrus* new species. Dorsal view of female. *Type.* Ocotlan, Oaxaca, Mexico. (× 2.)

Fig. 2. *Schistocerca insignis* new species. Lateral view of male cercus. *Type.* Guadalajara, Jalisco, Mexico. (Greatly enlarged.)

Fig. 3. *Schistocerca insignis* new species. Lateral view of female. *Allotype.* Guadalajara, Jalisco, Mexico. (× 1⅛.)

Fig. 4. *Rhachicreagra mexicana* new species. Lateral view of male. *Type.* Cordoba, Vera Cruz, Mexico. (× 3.)

Fig. 5. *Necaxa micans* new species. Lateral view of male. *Paratype.* Necaxa, Puebla, Mexico. (× 3.)

Fig. 6. *Necaxa puebla* new species. Dorsal view of male cercus. *Type.* Necaxa, Puebla, Mexico. (Greatly enlarged.)

Fig. 7. *Arachnitus filicrus* new species. Dorsal view of male. *Type.* Oaxaca, Mexico. (× 1½.)

## PLATE XIX

Fig. 1. *Dichopetala poecila* new species. Ventral view of male subgenital plate. *Type.* El Mante, Tamaulipas, Mexico. (Greatly enlarged.)

Fig. 2. *Arachnitus filicrus* new species. Lateral view of female. *Allotype.* Oaxaca, Mexico. (× 1½.)

Fig. 3. *Psilinsara annulata* new species. Dorsal view of female. *Type.* Guadalajara, Jalisco, Mexico. (× 2.)

Fig. 4. *Anaulacomera oaxacae* new species. Dorsal view of male cercus. *Type.* Almoloyas, Oaxaca, Mexico. (Greatly enlarged.)

Fig. 5. *Anaulacomera oaxacae* new species. Lateral view of female. *Allotype.* Almoloyas, Oaxaca, Mexico. (× 1½.)

Fig. 6. *Phrixa puebla* new species. Lateral view of male. *Type.* Sierra de Zacapoaxtla, Puebla, Mexico. (× 1½.)

Fig. 7. *Phrixa puebla* new species. Dorsal view of male pronotum. *Type.* Sierra de Zacapoaxtla, Puebla, Mexico. (× 4½.)

Fig. 8. *Phrixa carinata* new species. Lateral view of male. *Type.* Sierra de Nayarit, Mexico. (× 1½.)

Fig. 9. *Phrixa carinata* new species. Dorsal view of male pronotum. *Type.* Sierra de Nayarit, Mexico. (× 4½.)

## PLATE XX

Fig. 1. *Microcentrum simplex* new species. Lateral view of female. *Allotype.* Morales, Izabal, Guatemala. (× 1½.)

Fig. 2. *Microcentrum stylatum* new species. Lateral view of female. *Paratype.* Pueblo Viejo, Vera Cruz, Mexico. (× 1½.)

Fig. 3. *Microcentrum californicum* new species. Dorsal view of male. *Type.* Campo, San Diego County, California. (× 1½.)

Fig. 4. *Microcentrum californicum* new species. Lateral view of female. *Allotype.* San Pedro Martyr Mountains, Baja California, Mexico. (× 1½.)

Fig. 5. *Liparoscelis insignis* new species. Dorsal view of male. *Type.* Temax, Yucatan, Mexico. (Natural size.)

Fig. 6. *Liparoscelis insignis* new species. Lateral view of female. *Allotype.* Chichen-Itza, Yucatan, Mexico. (Natural size.)

Fig. 7. *Symphyloxiphus varians* new species. Lateral view of caudal limb of male. *Type.* Punta Gorda, British Honduras. (Much enlarged.)

Fig. 8. *Symphyloxiphus varians* new species. Lateral view of female ovipositor. *Allotype.* Punta Gorda, British Honduras. (Much enlarged.)

## PLATE XXI

Fig. 1. *Oaxacella whitei* new species. Dorsal outline of female head and pronotum. *Type.* Almoloyas, Oaxaca, Mexico. (× 4.)

Fig. 2. *Ochrotettix salinus* Bruner. Dorsal outline of female head and pronotum. *Allotype.* Salina Cruz, Oaxaca, Mexico. (× 4.)

Fig. 3. *Amblytropidia bruneri* new species. Dorsal outline of male head and pronotum. *Type.* Medellin, Vera Cruz, Mexico. (× 4.)

Fig. 4. *Amblytropidia insignis* Hebard. Dorsal outline of male head and pronotum. *Paratype.* Gatun, Canal Zone, Panama. (× 4.)

Fig. 5. *Amblytropidia pulchella* new species. Dorsal outline of male head and pronotum. *Type.* Atoyac, Vera Cruz, Mexico. (× 4 )

Fig. 6. *Phaedrotettix annulicornis* new species. Lateral view of apex of male abdomen. *Type.* Cordoba, Vera Cruz, Mexico. (× 6½.)

Fig. 7. *Phaedrotettix coloratus* new species. Lateral view of apex of male abdomen. *Type.* Necaxa, Puebla, Mexico. (× 6½.)

Fig. 8. *Melanoplus bakeri* new species. Lateral view of apex of male abdomen. *Type.* Guajimaloa, Distrito Federal, Mexico. (× 6½.)

Fig. 9. *Microcentrum simplex* new species. Ventral view of apex of male subgenital plate. *Type.* Morales, Izabal, Guatemala. (Greatly enlarged.)

Fig. 10. *Microcentrum simplex* new species. Dorsal view of male cercus. *Type.* Morales, Izabal, Guatemala. (Greatly enlarged.)

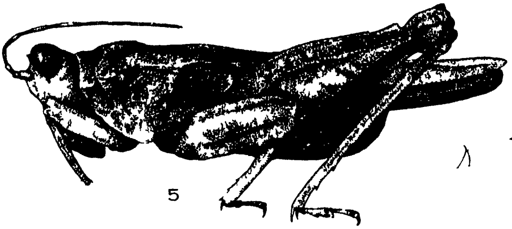
Fig. 11. *Microcentrum stylatum* new species. Ventral view of apex of male subgenital plate. *Type.* San Rafael, Vera Cruz, Mexico, (Greatly enlarged.)

Fig. 12. *Microcentrum stylatum* new species. Dorsal view of male cercus. San Pedro Sula, Honduras. (Greatly enlarged.)

Fig. 13. *Microcentrum californicum* new species. Ventral view of apex of male subgenital plate. *Type.* Campo, San Diego County. California. (Greatly enlarged.)

Fig. 14. *Microcentrum californicum* new species. Dorsal view of male cercus. *Type.* Campo, San Diego County, California. (Greatly enlarged.)

Fig. 15. *Gryllacris oaxacae* new species. Ventral view of male subgenital plate. *Type.* Almoloyas, Oaxaca, Mexico. (Greatly enlarged.)



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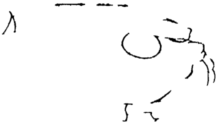

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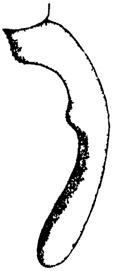

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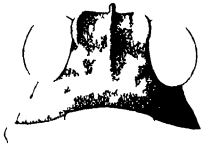

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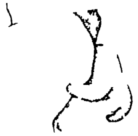

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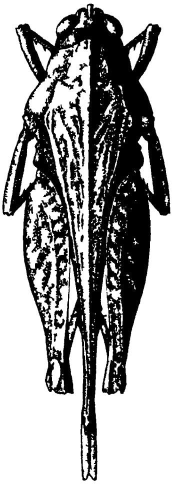

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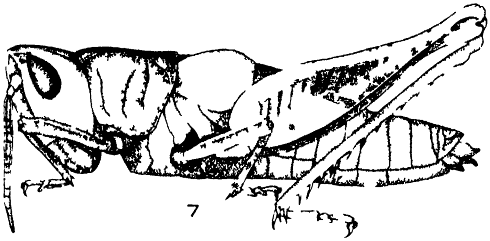

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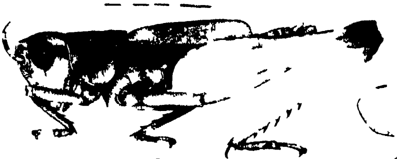

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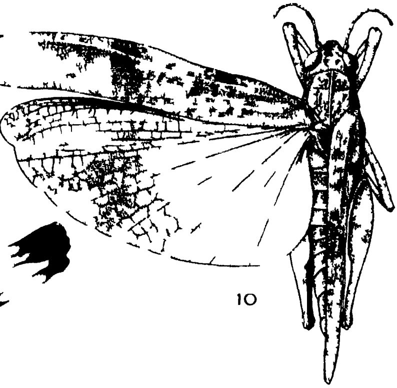

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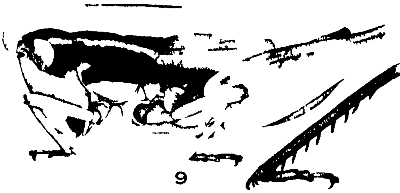

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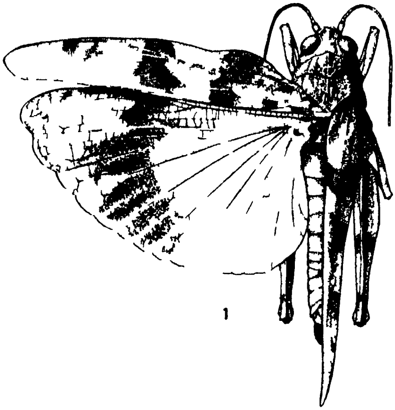
HEBARD—MEXICAN ORTHOPTERA



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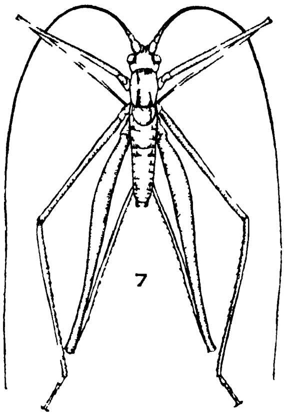

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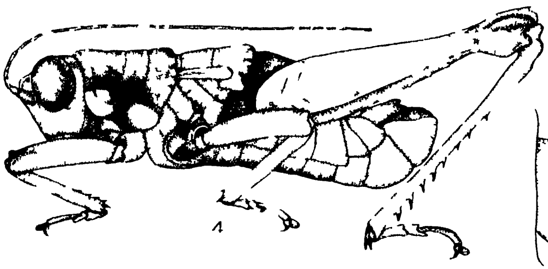

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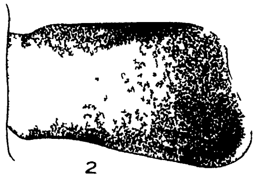

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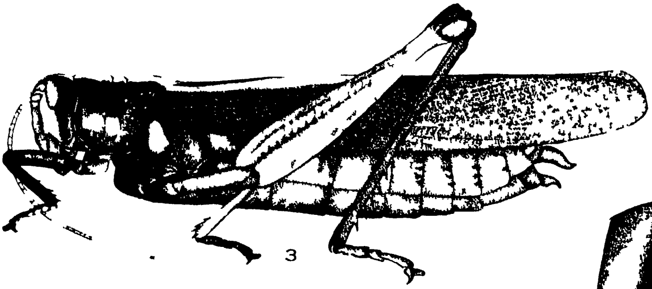

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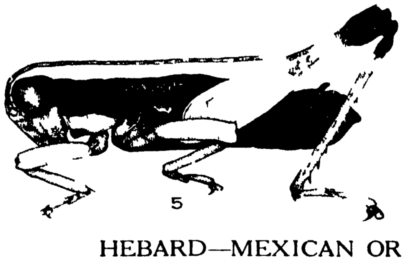

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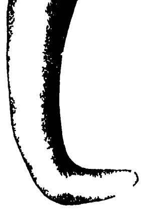

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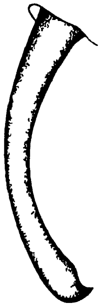

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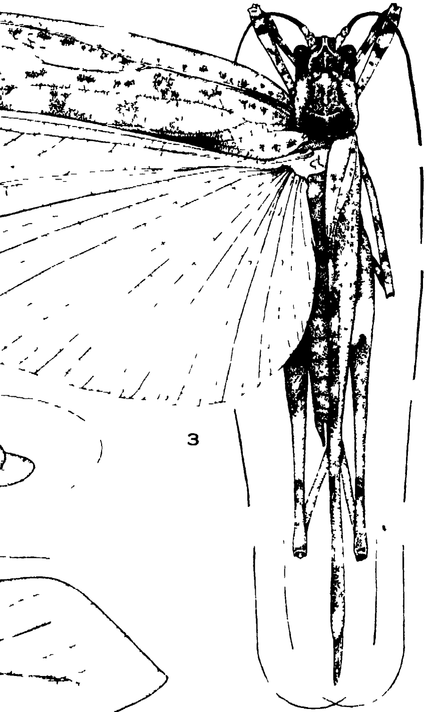

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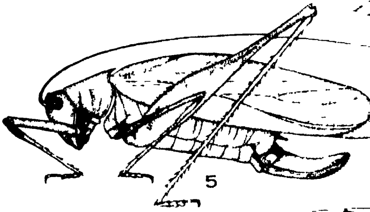

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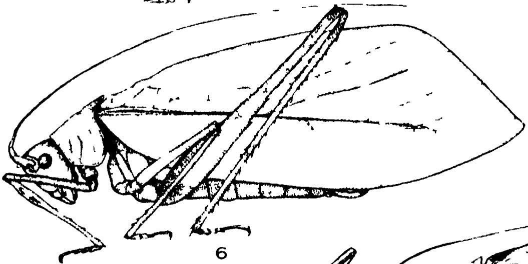

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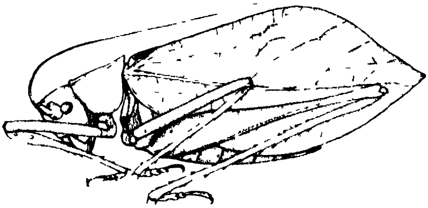

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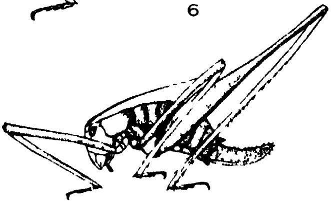

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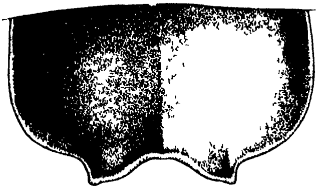

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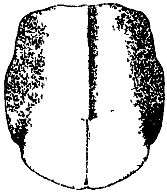

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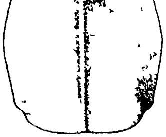

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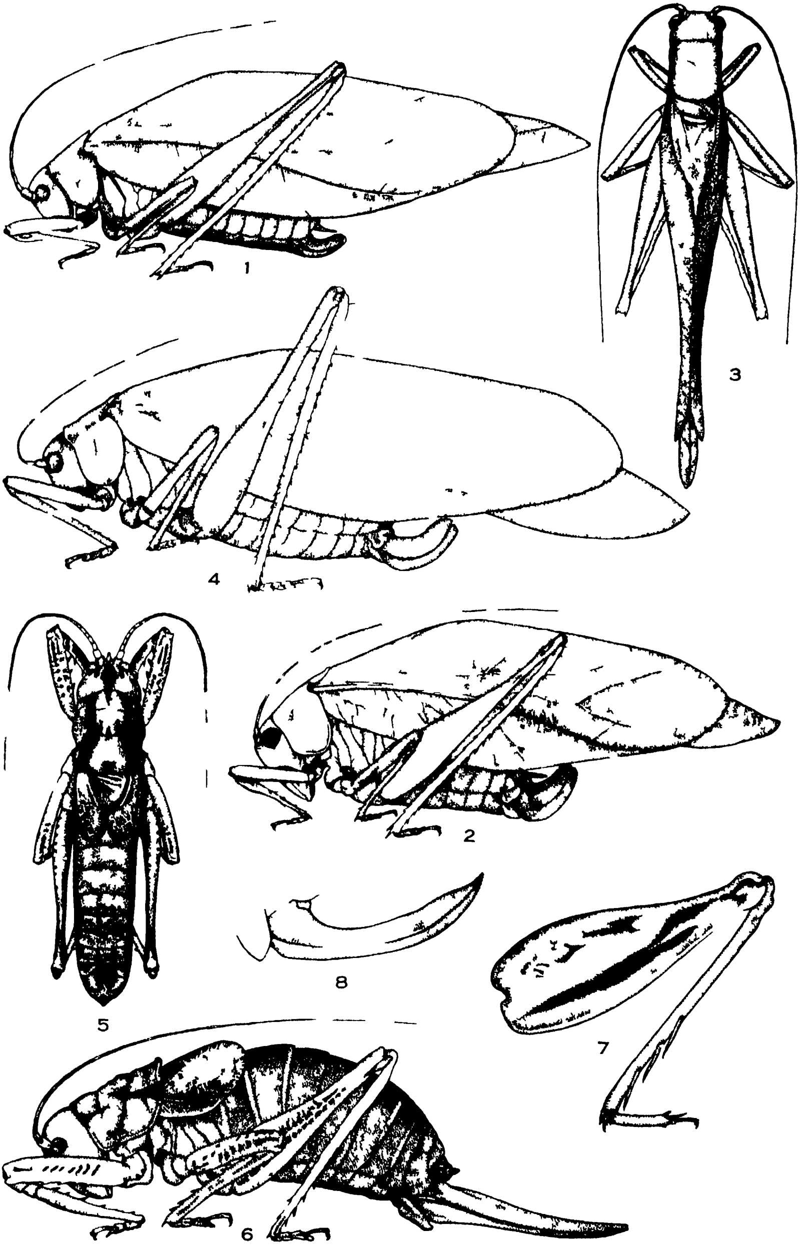
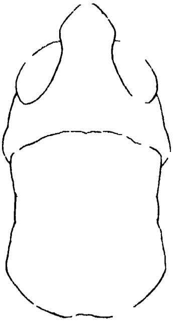
HEBARD—MEXICAN ORTHOPTERA



HEBARD—MEXICAN ORTHOPTERA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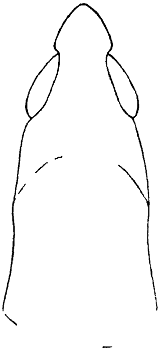
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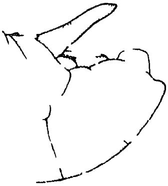
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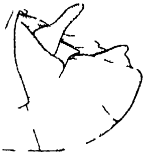
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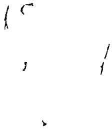
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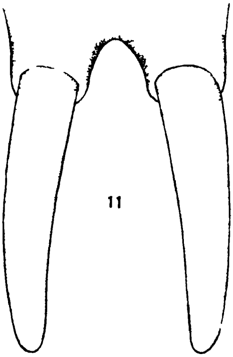
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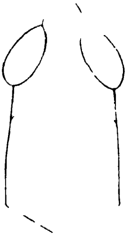
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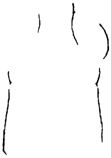
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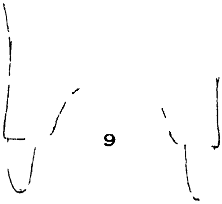
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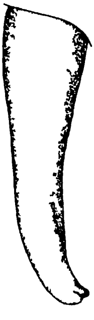
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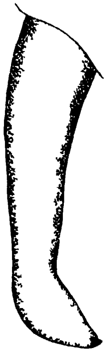
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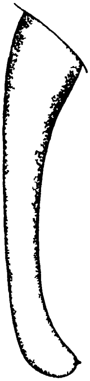
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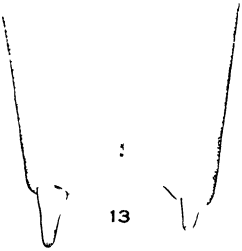
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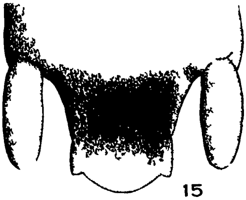
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HEBARD MEXICAN ORTHOPTERA

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